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WAGES AND THE ALLOCATION OF MANPOWER

-A THEORETICAL AND EMPIRICAL ANALYSIS

-THE CANADIAN EXPERIENCE 1946 - 1960

BY

WINSTON G. CHAMBERS

RESEARCH CENTRE
POLICY AND PLANNING BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES

OTTAWA

MARCH 1968

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". . . . . . . it is generally necessary to look at the whole of the economic, to say nothing of the moral and other aspects of a practical problem before attempting to deal with it all: and in real life nearly every economic issue depends, more or less directly, on some complex actions and reactions of credit, of foreign trade, and of modern developments. . . . ."

Alfred Marshall.

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ABSTRACT

This study attempts to test the validity of the theory of wages and labour mobility against the experience of leading Canadian manufacturing industries. The analysis, which falls into four parts, generates a variety of questions not encountered in previous researches of this kind.

Part I presents the setting and direction with reference to incomes policy and economic stabilization. It outlines the theory as adumbrated by Marshall and Hicks; critically appraises and discusses fundamental issues neglected by Friedman and his critics on the "Methodology of Positive Economics"; attempts to incorporate some methodological postulates with economic empiricism; demonstrates how the misapplication of certain statistical techniques to the problem tends to produce misleading results; advances a criterion for judging the adequacy of techniques; and evaluates the sufficiency of available statistical data with respect to the specifics of the theory.

Part II posits and tests four hypotheses, the principal of which is tested by a novel statistical technique. This technique captures the specifics of the theory and identifies four distinct groups of industries of which the theory accounts for two only. On the basis of the findings a measure of the relative tightness of the labour market, which blends in with the Phillips' curve, is advanced.

Part III presents four models. The first seeks to capture interdependence in terms of directional changes, while succeeding models identify association in

terms of both magnitudinal and directional changes. OECD's study, Wages and Labour Mobility is critically evaluated against the foregoing tests. Finally, a measure of wage and employment differentials is proffered and used to test the theory.

Part IV synthesizes and interprets the findings in terms of the existence of two allocative mechanisms in the labour market, and within this context, evaluates Professor Lloyd G. Reynolds' exposé of competitive labour market theory, and Professor Hicks' conception of equilibrium in the labour market.

PREFACE

This study represents a development of some of the main streams of thought which were current at the London School of Economics and Political Science, while I was there as a post-graduate student reading for the M.Sc.(Econ.).

I am thankful to Professors A.W. Phillips and Richard G. Lipsey for suggesting this area of economics for detailed study.

It was, however, while I was on the staff of the Economics and Research Branch of the Department of Labour in Ottawa that the research project was launched. I am thankful for the opportunity afforded me by that Department to embark on a research project of this kind. In particular I wish to express my sincere appreciation to Dr. Gil Schonning for his encouragement and helpful suggestions.

It's a pleasure to express my sincerest appreciation to Mr. Gary Hash of the Policy and Planning Branch, who ably assisted me throughout the study, and I wish to thank Mr. J. P. Francis, Director of the Economics and Research Branch, and Mr. J. W. MacNeill - Director of the Policy and Planning Branch, Department of Energy, Mines and Resources for allowing me to call on Mr. Hash's valued service.

Foremost among my acknowledgements is my deep debt of gratitude to Miss Elizabeth Durbin of the Graduate School of Business Administration, New York University, and Professor N. Arnold Tolles of the New York School of Industrial and Labour Relations, Cornell University. Miss Durbin read most of the manuscript, indicated points of ambiguity and argued me off some of my hobby-horses. When he least afforded the time, Professor Tolles read through an early draft and offered some very constructive criticisms, some of which I may regret not taking.

Finally, I should like to express my appreciation to Mrs. Ann Taylor who did all the computer programming, and to Miss Shirley Angel for her excellent typing of the manuscript.

WGC/March 1968.

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PART I

INTRODUCTION

PRELIMINARY DISCOURSE

The experience of the post-war years has, in invalidating the Keynesian theory of price level changes, presented a formidable problem to economists who are primarily concerned with policy decisions relating to the maintenance of full employment, sustained economic growth and relative price stability. Keynes, it will be recalled, maintained that if under-employment exists then it is quite unlikely that there will be either significant decreases or increases in the price-level, because any increase in aggregate demand will be reflected mainly in output and not price changes. On the other hand, Keynes held that in a situation of full employment any expansion in aggregate demand will be reflected mainly in price-level increases. Recently, however, the occurrences of significant prices level increases when unemployment rates are well in excess of the frictional minimum would seem not only to refute Keynes' explanation of the behaviour of the general price level during full and under-employment conditions, but they also tend to demonstrate that full employment, rapid economic growth with relative price-level stability, and equilibrium in the balance of payments are incompatible objectives of economic policy. The incompatibility of these policy objectives would seem in the main to be the result of disproportionate sectoral growth rates and the concomitance of bottlenecks which arise from the relative

immobility of productive factor inputs, trade union pressure and the immobility of industry. The belief that these factors are proximate causes of inflation in a growing economy has initiated considerable interest in the development of economic policies which will facilitate a sustained high level of economic growth while reducing the critical level of unemployment below which inflationary pressures set in.

Two methods, incomes policy and economic planning, which complement each other are being mooted by governments and business alike. Incomes policy it is felt will keep wage and non-wage incomes within the limits set by productivity changes. Economic planning will, by facilitating greater factor and industry mobility in an era of rapid technological change, tend to accelerate the adjustment process thereby minimizing the occurrence of bottlenecks.

But incomes policy and economic planning, or any other form of interference with the market forces presupposes the failure or partial failure of the price mechanism to perform its traditional allocative role efficiently. Even if it were assumed that intervention with the market mechanism is socially desirable - one should be able to specify how much interference or direction is necessary to achieve the desired objective. This issue can not, of course, be settled on the basis of intuitive reasoning - but should be evaluated empirically, and the one way of doing this is to attempt an evaluation of the way in which and the extent to which the price mechanism allocates scarce productive factor inputs among competing uses.

In this study the analysis will be confined mainly to the labour market. The questions relating to the labour market which appear pertinent in the foregoing context are:-

1. To what extent is wage flexibility essential in the distribution of labour among industries, occupations and regions? If wages do not appear to be performing their function satisfactorily, as some economists are now inclined to feel, what then including labour mobility are the principal determinants of wage movements and how may the theory of wage determination be modified to take account of these factors?

2. Why do wage increases tend to outstrip changes in labour productivity even when the economy may be experiencing significantly high levels of unemployment? In other words, what kind of market mechanism or combination of market and institutional forces are likely to generate the phenomenon in which wages are rising faster than physical productivity while unemployment rates are far in excess of the frictional minimum?

3. To what extent and in what manner are inflationary price movements influenced by the behaviour of wages, profits and other forms of income? How much economic justification is there for an incomes policy whereby governments may exercise some form of direct influence on wages, profits and other incomes in the hope of limiting unwarranted price-level increases?

These problems have been intensely investigated during the post-war period - and some economists have as a result of their empirical findings begun

to entertain doubts as to the effectiveness of wages as an allocator of manpower. In this enquiry, we will attempt to examine these problems and will commence by reviewing the orthodox theory not only in the hope of placing the problems in perspective but also to consider the implications of the theory for empirical analysis.

As in the case of most theories, the evolution of the theory of wages and labour mobility has been rather slow. Prior to Marshall, theoretical analyses of this problem were at best fragmentary. The first significant attempt at a systematic analysis came from Marshall himself who sought to provide us with a model of the operation of the labour market. In this model he endeavoured to explain the relation between wage differentials and the allocation of manpower among employers, occupations, industries and regions as the market tended to move toward equilibrium. He referred to the *tendency* of competition to result in the *equality of efficiency earnings in the same district.*[1]

> *This tendency (he though) will be stronger, the greater is the mobility of labour, the less strictly specialized it is, the more keenly parents are on the look-out for the most advantageous occupations for their children, the more rapidly they are able to adapt themselves to changes in economic conditions, and lastly the slower and less violent these changes are.*[2]

In his discussion of the supply price of labour in an occupation, Marshall emphasized that the supply price constituted both money earnings and "net advantages". Thus he wrote:

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(1) Alfred Marshall, *Principles of Economics,* 8th edition; Macmillan & Co. Ltd., London, 1952, p.456.

(2) Ibid., pp. 456-457.

> *We must take account of the facts that one trade is healthier or cleanlier than another, that is carried on in a more wholesome or pleasant locality, or that it involves a better social position; . . . Some persons, for instance, are so fond of having a cottage to themselves that they prefer living on low wages in the country to getting much higher wages in the town; while others are indifferent as to the amount of house-room they get, and are willing to go without the comforts of life provided they can procure what they regard as its luxuries.*[3]

Throughout his analysis Marshall was at pains to emphasize the non-existence of perfect competition in the labour market, and he was even critical of his predecessors whom he felt in their analyses implied its existence. Consequently, he wrote:

> *Perfect competition requires a perfect knowledge of the state of the market; and though no great departure from the actual facts of life is involved in assuming this knowledge on the part of dealers when we are considering the course of business in Lombard Street, the Stock Exchange, . . . it would be an altogether unreasonable assumption to make when we are examining the causes that govern the supply of labour . . . The older economists, in constant contact as they were with the actual facts of business life, must have known this very well enough; but partly for brevity and simplicity, partly because the term 'free competition' had become almost a catchword, partly because they had not sufficiently classified and conditioned their doctrines, they often seemed to imply that they did assume this perfect knowledge.*[4]

The contributions of Marshall and his contemporaries, in particular J.B. Clark, were followed in the late 1920's and early 1930's by a series of standard works[5] all based on the marginal productivity theory. While these

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(3) Ibid., p. 463.

(4) Ibid., pp. 448 – 449.

(5) J.B. Clark, *The Distribution of Wealth*, 1900.
P.H. Douglas, *The Theory of Wages*, 1934.
J.R. Hicks, *The Theory of Wages*, 1932.
A.C. Pigou, *The Theory of Unemployment*, 1934.
J.F.W. Rowe, *Wages in Practice & Theory*, 1928.
W.L. Valk, *The Theory of Wages*, 1928.

studies were somewhat diverse in their emphasis the most important of them could be said to represent comprehensive restatements of the then existing wage theory. But it would, one should think, be correct to say that Hicks' *Theory of Wages* is, on purely theoretical grounds, the most significant Marshallian performance in the field. His analysis of the labour market as distinct from product markets is in many respects most pertinent for our present enquiry. This observation in no way denies the importance of the contribution of some of the other works cited. Douglas' study for instance, was at the time one of the boldest ventures in quantitative economics.

In Chapter IV of *The Theory of Wages*, Hicks commented as follows:

> *When the economists of the late nineteenth century wished to concentrate on the imperfections of the labour market caused by cost of movement, they usually contented themselves with the analysis of one special case, where costs of movement are sufficient to shut out competition over a considerable range.*[6]

But Hicks went on to state that there are also imperfections in the regular market. If there is, he argues, an increase in the amount demanded of a particular class of labour this need not force up wages if there are unemployed workers.[7] In support of this latter proposition Hicks commented thus:

> *Probably the normal process is for an expanding firm to seek labour through the usual channels, telling foremen to tell their friends, and such hap-hazard methods, by advertisement, or (nowadays) through Labour Exchanges. At first it will not be difficult to get men of reasonably good quality, but*

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(6) J.R. Hicks, *The Theory of Wages,* Peter Smith, New York, 1948, p. 61.

(7) This proposition has been extended and refined by Professor Reynolds in his interesting theoretical analysis of "The rising labour supply curve" Lloyd G. Reynolds, *The Structure of Labour Markets,* Harper & Brothers, New York, 1951, pp. 225-229.

> *after a time the supply at the old rates will dry up. At this point the expanding firm may take the initiative in offering higher rates, but more probably applicants for work, realizing that the market is now getting tight, will demand higher rates. Indeed, the applicants may very well prove to be men who already have a job, but are willing to move if it is made worth their while. In one or other of these ways the wages paid by an expanding firm must ultimately rise.*[8]

Hicks clearly recognized that the transmission of an increase in wages among industries may be very slow. Hence he commented:

> *Since the general rise in wages depends upon the action of workmen, on their moving from one employer to another, or on their consideration of the possibility of such movement, it is easy to see that the transmission of an increase must be a slow process . . . There can be little question that this slowness is largely responsible for those local differences in wages which present a picture of such bewildering complexity in many trades.*[9]

> *Even in a position of equilibrium, some local differences indeed would probably persist. Some are due to differences in the cost of living, some to the indirect attractions of living in certain localities, some are simply due to differences in efficiency. The conditions of equilibrium postulate no more than that the "net advantages" of the employment in different places must be equal for labour of equal efficiency.*[10]

> But although *the movement of labour from place to place is insufficient to iron out local difference in wages. . . movement does occur, and recent researches are indicating more and more clearly that differences in net economic advantages, chiefly differences in wages, are the main causes of migration. The labour market is not a perfect market; the equalizing forces do not act quickly and easily, but nevertheless they do act.*[11] *Potential mobility is the ultimate sanction for the inter-relation of wage rates.*[12]

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(8) Hicks, op. cit., p. 73.

(9) Ibid., p. 74.

(10) Ibid.

(11) Ibid., p. 76.

(12) Ibid., p. 79.

In sum, the conventional doctrine of wages and labour mobility tells us that the principal function of wages is to allocate the leading productive resource, manpower, among industries, occupations and regions. Labour reacts to wage differentials by moving to the jobs offering the most favourable terms of employment. How valid is this theory?

METHODOLOGICAL EXCURSION

It seems necessary at this stage to digress briefly in order to consider some methodological issues which are of crucial importance in economic empiricism in general and to this study in particular. Many methodological principles have been aired in the recent debates[13] on Prof. Milton Friedman's brilliant essay - "The Methodology of Positive Economics".[14] In one of these debates Prof. Herbert A. Simon made this very trenchant remark, "I find methodological enquiry interesting and instructive to the extent to which it addresses itself to concrete problems of economic science".[15] This observation would seem to imply that economic methodology is meaningful only when it relates directly to issues of economic empiricism. We accept the view that basic methodological principles which have gained wide acceptability among economists should where possible be incorporated and explicitly applied to empirical analyses. On the other hand, to relegate the role of methodology - that is the logic of scientific investigation - solely to empirical enquiry would seem not only to restrict its applicability but also to imply that the only valid test to which a theory can be subjected is empirical.

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(13) See Appendix 1 for the list of articles which comprises the debates.

(14) Milton Friedman, *Essays in Positive Economics,* University of Chicago Press, Chicago, 1953.

(15) Herbert A. Simon, "Problems of Methodology – Discussion", *American Economic Review, Papers and Proceedings,* LIII (May 1963), p. 229.

Not many economists would deny that empirical analysis properly conducted constitutes by far the most severe form of critical examination to which a theory may be subjected. Thus there is a prima facie case not only for testing the validity of those theories which purport to have empirical content but also for seeing that methodological discussions do bear directly on some of the problems inherent in economic empiricism. But since not all theories lend themselves to empirical testing - and since some of these theories are not only currently accepted but are frequently used to analyze and appraise empirical findings it becomes clearly evident that methodology should also apply equally well to those theories that are deductive in character. The history of economic analysis is replete with theories (e.g. the quantity theory of money, Say's Law of Markets, the Wages fund theory, etc.) which have either been discarded or considerably modified mainly on the basis of intuitive reasoning.

Taken to its logical extreme a critical empirical test would necessitate a test of all theories that are used in an ancilliary capacity in the enquiry. However, since this is well-nigh impossible even die-hard empiricists must and do impose confidence in many empirically unverifiable theories. Unverifiable in the sense that they can only be questioned in terms of their empirical plausibility.

Furthermore, a theory with empirical content may be valid but may defy empirical testing because the theory may refer to a class of phenomena which is in some measure alien to the existing body of theory - and for which there exist no data. That is to say the theory may be so revolutionary or so far removed

from our experience that some time must elapse before the theory is ingested and a method of testing developed. Clearly, in this case we should not disregard the theory simply because the state of knowledge does not permit of an empirical test. It may well be that the theory may in fact represent a genuine advance in knowledge.

In the light of the foregoing and in virtue of the fact that not many serious attempts have been made, in so far as we are aware, to incorporate and apply some of the basic methodological principles on which there seems to be some general concensus to the empirical testing of economic theory, we will attempt to re-examine, analyze and where possible employ some of these principles to the present study. This approach will of necessity also involve the consideration of certain methodological problems which were neither fully discussed nor considered in the debates.

In essence the great methodological dialogue which was sparked off by Friedman centred around the following:-

i. The definition, nature and role of economic theory. What makes for the general acceptability of a theory?

ii. What are the characteristics of the underlying assumptions of a theory and how significant a role do these assumptions play in the formulation of valid theories? How important for instance are such factors as the choice, and the reality or unreality of assumptions in assessing the validity of theories?

These issues though crucial in economic empiricism are not all embracing. There are many other equally important methodological problems which are central to economic empiricism - but which were overlooked in the debates.

In the main the issues are:-

a. To what extent does the level of abstraction of a theory determine the number of real world situations which the theory can meaningfully predict?

b. If a theory is an abstraction, are not its predictions also abstractions?

c. If the predictions are in fact abstractions, what criteria should be used to ascertain how meaningful the predictions are in terms of real world phenomena? How much of a divergence between the predicted and actual values can reasonably be ascribed to the all embracing "error variable" or "ceteris paribus"? And how helpful are our statistical tests of significance in this case?

Simon apparently recognized the difficulties inherent in the injudicious use of significance test. This led to his commenting that:

> *The word 'significant' has been appropriated by statisticians to mean 'unlikely to have arisen by chance'. Now in testing extreme hypotheses – ideal types - we do not primarily want to know whether there are deviations from the theory which are 'significant' in this sense. It is far more important to know whether they are significant in the sense that approximation of theory to reality is beyond the limits of our tolerance.*[16]

This is an important observation - but it still leaves us with the problem of rendering meaningful in empirical terms the somewhat vague but striking phrase "the limits of our tolerance". We should imagine that one possible way of establishing whether the divergence between predicted and actual values are significant in the sense of falling within "the limits of our tolerance" is to note whether policy decisions based on this empirical relation consistently generate

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(16) Ibid., p. 231.

results which the postulated theoretical relation would lead us to expect. In other words although a correlation coefficient may not be statistically significant, yet it may be quite significant in terms of economic policy if the relation is found to hold under all conditions.

All these questions would seem to indicate that theoretical explanations and predictions of reality are in a sense incomplete. Now if theoretical statements are at best imperfect, it follows that a theory is neither "true" nor "false" but rather more or less false. If this is so what criteria should be used to differentiate a refutation from a confirmation? In other words how imperfect must a theory be before it comes to be regarded in the conventional sense as false. This, it should be observed, is an entirely different question from asking when should a probability statement be accepted or rejected.

d. Where a theory purports to be universal in its applicability how meaningful is a test of its validity when it is unwittingly tested against what may in fact be a special case or a number of special cases? Put another way, the more unrealistic are the assumptions of a theory, the more abstract is the theory likely to be, and hence the wider its range of applicability. If this is correct, then is the validity of the theory really being tested when the experience against which it is tested may be (in terms of the intent and scope of the theory,) merely a special case? This suggests that it may be profitable to attempt to recognize if the experience being tested is, within the context of the theory, a special or general case.

e. Again, where the predictions of a number of competing theories are found to be consistent with observed facts what criteria should be used to ascertain which of these theories do in fact provide the most appropriate explanation? Friedman's criteria are "simplicity" and "fruitfulness". These criteria while appearing to provide appropriate guidelines for choosing among rival theories - have been too narrowly defined by Friedman to be sufficient. His conception of "simplicity" neglects an important condition - "the degree of testability". Since theories are more or less testable, and in consequence more or less, easily falsifiable, it follows that the degree of testability should be an important criterion in the selection of theories.

f. Where a theory is held to be applicable to real world phenomenon shouldn't its validity be assessed not only with reference to its predictive content but also in terms of its explanatory power? In other words does the adequacy of a predictive hypothesis necessarily imply that the hypothesis will perforce provide a rationally acceptable explanation? Certainly not. Not all predictively adequate hypotheses afford acceptable explanations of phenomena which they may otherwise appropriately describe. This of course does not preclude the possibility that a prediction may lead to a probable explanation. The converse proposition would seem more likely. That is to say, that a hypothesis which furnishes a rationally acceptable explanation is most likely to provide an adequate prediction. The plausibility of this contention may be illustrated with reference to the Phillips Curve.[17]

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(17) A.W. Phillips, "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861 – 1957", *Economica,* XXV (November 1958).

Phillips Curve which is based on the hypothesis that the rate of change of money wage rates is a function of the level of unemployment, $W = f(u)$, has come to be regarded as a key empirical relationship of considerable predictive merit and has been extensively applied in analyses of the cost-push and demand-pull versions of inflation. None the less, if we were to neglect Phillips' explanation, his hypothesis when taken by itself would not account for the observed relation between W and u. In other words, although the Phillips curve per se does in fact provide an appropriate description of a certain phenomenon, the existence of the statistical regularity enunciated by the hypothesis does not tell us why this now widely accepted empirical relation holds. To understand why this relation holds we must enquire into its possible causes. This implies hypothesizing about the way in which the crucial market and institutional forces which enter into this functional relationship interact and the mechanism whereby they generate the observed results. A good theory should seek therefore not only to predict but also to provide a systematic explanation of facts by ascertaining the conditions and consequences of events while demonstrating the logical relationships of propositions to one another and to the system as a whole. Thus the explanatory aspect of any theory is vitally important if the workings of the economic system as a whole are to be understood and effectively controlled.

In sum, it seems somewhat misleading to over-emphasize (as is too often the case) the predictive aspect of the theory in assessing its validity - if indeed the role of theory is to predict and to explain.

g. Are postulated relations and assumptions interdependent? If they are, what does this imply for the feasibility of testing assumptions found in conditional statements? That is to say, to what extent are the assumptions of a conditional statement necessary for the outcome or existence of an empirical relation postulated by a theory? Some economists maintain that the assumptions of a hypothesis are of little account provided the predictions of the hypothesis are adequate. Accordingly, it has been argued that the validity of an assumption or set of assumptions should not be considered a problem unless the hypothesis has been falsified by the evidence. But should the importance of assumptions be dismissed that lightly? If, for instance, more than one hypothesis prove to be both predictively and explanatorily adequate, does this not imply that certain relationships may hold in spite of differences in underlying conditional statements. This implies that widely different assumptions may appear equally plausible. In such cases, how should one set about establishing the most appropriate hypothesis from a set of apparently equally valid hypotheses?

One possible way out is to try and establish the ease with which each of these hypotheses fits into the schema of a more comprehensive theory of which these hypotheses are supposed to be an integral part. In sum, the most appropriate hypothesis would be the one whose assumptions and implications are logically consistent within the framework of a more all-inclusive theory.

h. What type of relations are most frequently encountered in economic theory? Are these relations unique, and if they are unique are they also determinate?

To the extent that they are not unique but determinate, or unique but indeterminate, what does this imply for empirical testing? In other words what constitutes a critical test. This, of course, gets us back to a major problem - the degree of testability.

METHOD

The validity of the findings of any empirical research greatly depends upon the appropriateness and adequacy of the test on which the findings are based. Implicit in this latter observation is the problem of establishing a general set of conditions which the technique or set of techniques should satisfy if the results based on them are to be acceptable. No attempt will be made here to lay down general principles or criteria of what may be taken as constituting valid tests in economic empiricism in general - a problem which was overlooked in the debates referred to above. The problem is integrally related to the degree of testability and the precision of the techniques used in the test. In consequence, we will endeavour while testing the theory of wages and labour mobility to prescribe certain minimum conditions which the techniques of analysis should satisfy if the finding arising out of their use are to be acceptable. In doing this, we will attempt to demonstrate, using Canadian statistical data, how the misuse of certain statistical techniques may have rendered certain currently accepted empirical findings of dubious validity.

If a technique is adequate it should greatly assist us to establish (from available statistical data) the extent of the association and the nature and form of the relation between inter-industry wage-differentials or changes in these differentials and inter-industry manpower flows. In short, techniques should enable us to ascertain whether a postulated relation does in fact exist, whether such a

relation is unique,[18] and finally if the relation is determinate. A determinate relation is defined here as one in which the form of the association of variables can be specified. It is usually logically possible to construct or set up a systematic explanation of a phenomenon which may, a priori, be widely acceptable, but which defies empirical verification because of the difficulty of specifying the precise mathematical form of the association. It is only after ascertaining whether the relation is determinate in this sense that one should become concerned with the possibility of a solution.

In sum, we will strive, in testing the theory of wages and labour mobility to appropriate those techniques of analysis with which it will be possible to indicate the existence of relations, the nature of the relations - unique or otherwise, the extent to which these relations are determinate, and the solvability of these relations. These factors should serve not only to indicate the merits of techniques customarily employed to analyze this problem - but also to suggest the necessary requirements of any new technique which may be devised to examine the problem on hand.

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(18) A unique relation is considered here to be one in which the pattern of the mathematical expression or equation describing the postulated association is invariant. However, the coefficients of such an equation may under differing conditions take on varying numerical values. Thus a unique relation need not necessarily imply a unique solution. In short, a relation is said to be unique if and only if the pattern of the association of the variables comprising the relation holds in all cases in which the variables are present. Consequently, the application of such a relation would be valid for the entire economy, sectors of the economy, industries, firms, etc. if the variables comprising the relation are common to all these groups. That is to say uniqueness as conceived here precludes the possibility of the existence of a fallacy of composition.

Simple regression analysis has been frequently employed to estimate the nature of the association between inter-industry wage-differentials and inter-industry manpower flows. But is simple regression analysis an appropriate technique for this kind of investigation, and if not, how much confidence can one place in its findings?

It is well known, that scatter diagrams, for instance, may be usefully employed in the following manner:-

i. To provide visual evidence of correspondence between two variates;

ii. To point to the possible existence of a relation, thereby indicating the worthwhileness of proceeding to estimate the degree of association, or conversely, to point to the need to examine more closely the factors which may account for an apparent lack of association where a priori reasoning postulates otherwise;

iii. To provide an indication of the nature of the relation - i.e., whether the relationships are linear or non-linear, direct or inverse, lagged or unlagged, and so on;

iv. To provide a rough first approximation of the form which the values of the variates should take in order to reveal the highest possible correlation between them. Economic theory rarely, if ever, postulates a precise numerical relation between variables which are assumed to be related, because these relations are not invariant through time. The theory of wages and labour mobility is a case in point. It states, inter alia, that labour supply is a function of wages, but does not specify whether it is the level of wages, absolute changes in wages,

or percentage wage changes to which the supply of labour responds. In cases such as this, scatter diagrams can be very helpful indeed, because by plotting the data on arithmetic, semi-logarithmic and full logarithmic graph papers, visual comparisons can be made of absolute changes in both variates, proportionate changes in one variate with absolute changes in the other, and proportionate changes in both variates, respectively.

In spite of the many uses to which scatter diagrams may be put, this technique has certain limitations which restrict its usefulness in problems such as that with which we are now concerned. It is well known, for instance, that causal relation and causality are theoretical rather than empirical concepts. Thus a scatter diagram cannot of itself provide any inference of causality. A more serious shortcoming of scatter diagrams, which though thoroughly discussed in the literature is sometimes overlooked, is its inability to deal with an interdependent system of relationships. Economic theory states that under competitive conditions the amount of labour supplied to an industry is a function of wages or wage changes in that industry relatively to what obtains in all other industries in the system. Now if we plot wage changes in one industry against employment in that industry alone, it is quite inconceivable that we will be able to draw any meaningful inference about the relation between wages and employment from such an exercise. This is so because each point on the scatter diagram is the resultant of the interactions, not only of wages and employment in a single industry, but rather of the complex of wage and employment changes in

all industries in a given time period. Therefore, the scatter diagram can, at best, provide only a kind of partial analysis which is clearly inadequate for our purpose.

Nor, for the same reasons, can this problem be resolved by fitting regression curves to the data of the scatter diagram. The oversight of this basic fact has sometimes produced misleading empirical results. Thus, we may encounter instances where the lack of association between wages and employment in industries, which have been examined singly being accounted for by such factors as, differences in skill-mix, the distortion arising out of treating spatially unconnected labour market areas as if they were in fact a single market, the level of aggregation, the influence of non-wage terms of employment, etc., etc. No one will deny that these factors may tend to obscure the relation between wages and employment trends in an industry, but it is doubtful whether this can be established by using simple regression analysis which cannot be applied in any meaningful way to inter-dependent systems of relations.

There is yet another shortcoming of simple regression analysis which does not appear to have been fully treated in the literature, but which we should imagine may be of some importance in economic empiricism. This shortcoming stems from the apparent neglect of the temporal order in regression analysis. Simple regression curves which are fitted to scatter diagrams based on two economic time series contain both a spatial and a temporal order. Thus most scatter diagrams though represented on a two dimensional surface are really

three dimensional in character. These dimensions are the magnitudes of the independent and dependent variables, respectively, plus the *time* variable which is made to coincide with these points. However, in the fitting of regression curves to bivariate distributions involving time, it is customary to average out the magnitudes in the direction of the dependent variable without regard to the temporal order of the data. That is to say, cognizance is not taken of the chronological sequence of the series, because the series is treated as if its chronological order moved in unison with the direction of the path traced out by the fitted trend.

The introduction of time lags, while taking cognizance of time, in no way invalidates this criticism: because the lagging of economic variables is primarily concerned with the average reaction time interval and not *time order* as treated here. The use of time lags stems from the assumption that cause precedes affect by some finite time interval, and while its introduction may, by re-ordering the positions of the points spatially, serve to alter the slope and/or intercept of the regression curve, it should be noted that the mere re-ordering of points does in no way imply a conscious effort to capture the temporal order when viewed as a trend. Thus, even where time lags are used the chronological sequence of the data may be subsumed. This leads us to wonder if it is at all legitimate to speak of disturbances when the temporal order is not explicitly taken into account. There are, however, cases in which the temporal and spatial orders do move together in the same direction, and it is only in respect of these

cases that one may associate divergences from the trend with random shocks or disturbances.

A realization of the inability of simple regression analysis to deal adequately with an interdependent system of relationships has led some economists to use rank correlation analysis. As a technique of measuring the extent of the association between two variables, rank correlation may be said to possess certain advantages over simple regression and correlation analyses in dealing with specific types of data, especially qualitative data. However, in evaluating the degree and nature of the association between *trends* in inter-industry wage differentials and the corresponding movement of workers among industries, the merits of rank correlation are at best minimal.

The ordering of the numerical values of the wages of production workers among industries within any given time period, say a year, provides a very crude and inadequate measure of inter-industry wage differentials. This is so because the ranking of wages either by ascending or descending order merely serves to give the ordinal relation of an array but fails to use the magnitudes themselves. In other words, direction is all important in rank correlation analysis, but we are interested here in both direction and magnitude. Again, even if this limitation of rank correlation analysis were overlooked, it should be observed that it has not been used to rank inter-industry wage differentials or changes in these differentials with the concomitant movements of inter-industry employment differentials among years. This arises out of the fact that the rank

of the average wages paid by each industry is likely to change from year to year with respect to other industries. On the other hand, the ranking of wages and employment among industries for individual years will produce as many correlation coefficients as there are years, and while the resultant time series of coefficients may be interpreted so as to provide some approximation of the extent of the relationship between the two variables over time, this approach can hardly be regarded as satisfactory. In sum, whereas rank correlation may in a sense be used to indicate the existence of a relationship, it lacks continuity and hence cannot tell us anything about the nature of the relationship itself. Later, however, we will show how *ordering* can be successfully employed in certain cases. At this point we merely wish to indicate that the use to which some economists have put rank correlation analysis renders their findings highly questionable.

CONCEPTUAL ISSUES

The analysis has so far served to indicate two things; the need to devise appropriate tools of analysis; and the advisability of examining the nature of the relationship between wages and labour mobility in terms of an interdependent system of relationships. However, before going on to consider the adequacy of various techniques for analyzing the problem of interdependence, we will digress partly to draw attention to and clarify the problem of treating the average wages (weekly or hourly) of production workers as if these earnings were in fact synonymous with the theoretical conception of commodity prices; partly to note certain qualifications which lack of statistical data on fringe benefits force us to consider in our measurement of wage differentials; and finally to elucidate the theoretical justification for an empirical approach which presupposes an interdependent system of relations.

A wage is a price - the price of labour - and the structure of wages is the pattern of relative prices established in the market by the relative demand for and supply of labour of different kinds. If, therefore, the term price is taken to mean "the rate at which anything can be exchanged for anything else",[19] then conceptually wages and commodity prices are similar. Functionally, however, there is a fundamental difference - a difference which, as noted above, was alluded to by Marshall when he discussed the supply price of labour. Commodity

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(19) Alfred W. Stonier, and Douglas C. Hague, *A Textbook of Economic Theory,* Longmans Green & Co., London, 1953, p. 9.

prices are usually quoted in monetary terms, while the price of labour is customarily conceived as comprising two distinct elements, viz:

a. a pecuniary reward (money wages and fringe benefits); and
b. non-pecuniary considerations such as regularity of employment, physical nature of the job, agreeableness of supervision, intrinsic job interest, opportunity for advancement, etc.

Consequently, the total wage package of a worker can be made to fluctuate while the money wage remains constant. It is unfortunate, therefore, that the pecuniary value of fringe benefits and non-wage terms of employment are not estimated and incorporated in wage rates and wage earnings as published in official statistics. Thus wages and relative wages as may be garnered from most statistical sources cannot in any strict sense be regarded as synonymous to prices and relative prices. Moreover, the exclusion of the pecuniary value of fringe benefits and non-wage terms of employment from measurements of wages may well serve to distort any comparisons that may be made of inter-industry or inter-occupational wage differentials. In such circumstances, we will assume - not unrealistically - that the distribution of the combined pecuniary value of fringe benefits and non-wage terms of employment is directly proportional to the money wage level in each industry.[20] Hence the smaller the actual wage differentials

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(20) This assumption would seem to accord with the findings of Reynolds. According to Reynolds, "While conditions of work cannot be measured with the same precision, our visits to plants (which tended also to be the high-waged plants) have better physical conditions than most of the small plants. . . For the most part, then, the companies which can afford a high wage level can also afford to make the job pleasanter in other ways. Their superior financial ability expresses itself both in the wage structure and in other terms of employment. . . Non-wage terms of employment thus tend to accentuate wage-differentials rather than off-set them". Reynolds, op. cit., pp. 221-222.

between two industries, say A and B, the more likely it is that the combined pecuniary value of fringe benefits and non-wage terms of employment will tend to be equal in both industries. Hicks may have implied this when he postulated, supra, that differences in net economic advantages chiefly differences in wages are the main cause of migration of workers among industries.

Granted that these qualifications are permissible, we are still faced with the problem of deciding what concept of wages is best suited to our purpose. Should we use wage rates or wage earnings, and if earnings, should they be average weekly or average hourly earnings? Throughout this study we will be using average weekly wage earnings. However, where it becomes necessary to correct for the number of hours worked, average hourly earnings could be employed. The selection of average weekly wage earnings finds justification in the following:

1. Earnings may be increased or decreased substantially simply by loosening or tightening time standards without attempting to change the basic rates. Incentive workers may, for instance, increase their hourly output when weekly hours are reduced so that their weekly earnings are maintained without their being any change in the basic rates.

2. Most production workers think of meeting their contractual financial obligations - hire purchase payments, food, rent, union dues, etc. - weekly. Hence they are more inclined to think in terms of their weekly take-home pay rather than hourly rates.

3. Finally, average weekly earnings include overtime premiums. Some industries, for example, which pay relatively low hourly basic rates have been able to recruit and retain an adequate work-force merely by paying high overtime hourly rates, or by the number of overtime hours which have been made available to their employees.

It should be pointed out at this stage, however, that the use of average weekly or hourly wage earnings as indicators of the relative prices of production workers raises further problems. These problems derive mainly from the fact that the average or mean wage earnings of a heterogeneous group of production workers provides no information about the nature of the earnings distribution of the occupations comprising an industry's work-force. In other words, the statistics of the average weekly earnings implicitly overlooks the skill-mix of the industry!s work-force, thereby rendering comparisons of inter-industry wage differentials, hazardous. Furthermore, while this difficulty may be partly overcome by analyzing the problem in terms of inter-industry occupational earnings-differentials, it should be remembered that the use of averages in this case abstracts from quality considerations - a factor which, a priori, appears significant. It is clearly evident, therefore, that the lack of the relevant statistical data makes some of these problems insuperable. However, if adequate data were available, it would be possible to eliminate some of these obstacles, through successive disaggregation.

Throughout this study the analysis will focus on the movement of male production workers. In so doing we eliminate differences in average weekly wage earnings which derive from the male-female ratio of each industry's work force.

PART II

TESTING FOR INTERDEPENDENCE

PRELIMINARY TEST

In the preceding analysis we attempted to show, inter-alia, some shortcomings of simple regression and rank correlation analyses for evaluating the way in which and the extent to which wages perform their allocative function. We emphasized the need to exercise great care in the application of these techniques so as to be reasonably certain that the techniques do in fact capture the essentials of the theory.

Consequently, we will endeavour throughout the remainder of this study to guard against the possible misuse of techniques, and see that those techniques used do take explicitly into account the specifics of the theory. The interpretation of the theory should therefore serve to indicate the basic requirements or pre-requisites of an appropriate technique or set of techniques. Bearing this in mind, we will commence by analyzing and testing some of the broad implications of the theory. Furthermore, it is to be hoped that as the enquiry progresses we may be able to devise or recognize techniques of analysis which are particularly suited to the problem.

Orthodox theory, it will be recalled, states that the wage structure and employment trends of all industries are related through the goods and/or factor markets. In explaining inter-relatedness with respect to the factor, labour, the

theory postulates that there is a tendency toward the equalization of total attractiveness of similar jobs in a labour market where each employer considers his labour supply as primarily a function of wages. Thus when one industry raises the wages of its employees with a view to recruiting additional workers, then other industries desirous either of retaining or increasing their share of the available labour supply will initiate off-setting changes in the wages or other terms of employment of their employees. So conceived, the wages and employment trends of all industries in a competitive labour market area constitute an inter-dependent system of relationships. We will now attempt to test the validity of this theory to see the extent to which it is applicable to the labour market in general.[21]

The implications of the theory as set out here can be put in testable form with the aid of a simple model. Assume an economy in which there are three industries only. These industries may be designated for convenience of analysis as I_1, I_2, and I_3, respectively. Assume further that:

1) labour is a homogeneous factor,
2) non-wage terms of employment move pari-passu with money wages in each industry,
3) there are no institutional or spatial barriers to the free movement of workers among the three industries which comprise the hypothetical economy, and finally

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(21) The ideal situation would be to test this hypothesis with reference to specific occupational groups.

4) full employment prevails. Such employment as does exist being merely frictional - thereby implying that employment opportunities closely approximate a maximum and hence any increase in an industry's share of the labour supply will be at the expense of one or more of the other industries.

Under these restricting assumptions one of the principal implications of the orthodox theory of wages and labour allocation is that 'the three industries may be said to be related through the labour market if, and only if, the ranked order of the growth rates of employment shares of production workers among these industries correspond to the ranked order of the absolute growth rates of their money wage-earnings'. This is equivalent to saying: $\frac{dWI_1}{dt} \geqslant \frac{dWI_2}{dt} \geqslant \frac{dWI_3}{dt} \Leftrightarrow \frac{Es_1}{dt} \geqslant \frac{Es_2}{dt} \geqslant \frac{Es_3}{dt}$ where $\frac{dWI_1}{dt}$, $\frac{dWI_2}{dt}$ and $\frac{dWI_3}{dt}$ represent the absolute rates of change of money wage-earnings in industries I_1, I_2, and I_3, respectively; and $\frac{dEs_1}{dt}$, $\frac{dEs_2}{dt}$ and $\frac{dEs_3}{dt}$ are the growth rates of the percentage distribution of employment in industries I_1, I_2, and I_3, respectively. This system of relationships may be generalized and made applicable to economies with n industries where $n > 3$.

This hypothesis will be tested in respect of three geographical areas, namely Canada, Ontario and the Metropolitan Area of Montreal, with a view to correcting for possible distortions which may be occasioned by the aggregation of the diversity of labour market conditions which are bound to exist in as large a country as Canada. In the circumstance we would hope to obtain the most reliable results from the data for the Montreal area. But since the coverage of

the source of this data is not nearly as comprehensive as that for Canada and Ontario, and since manufacturing activity is highly concentrated in specific areas in Ontario - it is reasonable to suspect that the test may prove to be far more directly applicable to Ontario.

The empirical work involved in this test is straightforward. Fit regressions equations by the method of least squares to the time series of the average weekly wage-earnings of male production workers in each manufacturing industry and also to the data of each manufacturing industry's share of the total number of male production workers employed in all manufacturing. Differentiate each of these equations with respect to time to get the average rates of change of wage-earnings and employment shares for each industry. Rank these growth rates to see if the emergent ordinal scales of wage-earnings and employment shares accord with the implications of the hypothesis. The results of this first test are presented in Tables 1, 2 and 3.

Even the most cursory examination of these tables clearly reveals the total absence of any significant correspondence between the ordinal scales of the variables $\frac{dW}{dt}$ and $\frac{dEs}{dt}$. It must therefore be concluded that the hypothesis has been more or less falsified.

This is not altogether surprising. Many plausible reasons can be advanced to explain the inadequacy of the predictive power of the hypothesis. It can be argued for instance, that the conditions postulated by some of the underlying assumptions of the hypothesis are not likely to be met by the data used in the

TABLE 1

A COMPARISON OF THE RANKS OF THE GROWTH RATES OF SHARES OF EMPLOYMENT AND THE CORRESPONDING ABSOLUTE GROWTH RATES OF WAGE EARNINGS OF MALE PRODUCTION WORKERS - CANADA, 1946-1961

Industry	Growth Rates		Ranks	
	Employment Shares	Wage Earnings $	Employment Shares	Wage Earnings $
1. Pulp & Paper Mills.............	.0905	3.55	3	11
2. Smelting & Refining	.0979	3.88	2	9
3. Petroleum Refining.............	.0088	4.90	16	1
4. Slaughtering & Meat Packing.....	.0048	3.49	18	14
5. Motor Vehicle Mfg..............	-0.0520	3.94	36	8
6. Iron & Steel Industries..........	.0333	4.39	11	2
7. Sawmills (incl. shingles)........	-0.1776	2.49	39	32
8. Mfg. of Industrial Chemicals	.0528	4.22	8	3
9. Fish Products Industries........	-0.0048	1.33	21	40
10. Misc. Food Mfg................	.0058	3.07	17	22
11. Misc. Machinery...............	-0.0511	3.28	35	17
12. Metal Stamping, Pressing.......	-0.0077	3.47	25	15
13. Printing & Publishing...........	.0247	3.98	13	5
14. Bakeries	.0164	2.61	14	28
15. Distilleries....................	.0005	3.98	20	6
16. Aircraft & Parts Mfg	.1816	3.51	1	12
17. Fruit & Vegetable Canning.......	-0.0188	2.55	28	30
18. Butter, Cheese, Pasteurizing....	.0849	2.88	4	25
19. Veneer & Plywood..............	.0569	2.69	7	27
20. Men's Clothing Factories........	-0.0210	1.90	29	37
21. Women's Clothing Factories.....	-0.0113	2.24	26	36
22. Breweries....................	-0.0284	3.99	31	4
23. Electrical Apparatus & Supplies..	.0676	2.59	6	29
24. Synthetic Textile Mills..........	-0.0184	2.47	27	33
25. Cotton Yarn & Cloth	-0.0819	1.87	38	38
26. Sash & Door Planing............	-0.0245	2.29	30	35
27. Printing & Bookbinding	.0149	3.50	15	13
28. Tobacco Products	-0.0063	3.94	24	7
29. Wire & Wire Products	.0293	3.41	12	16
30. Flour & Feed Mills.............	-0.0402	2.89	32	24
31. Misc. Metal Fabricating	.0482	3.09	9	20
32. Mfg. of Pharmaceuticals........	-0.0058	3.18	23	19
33. Fabricated Structural Metal	.0730	3.77	5	10
34. Soft Drink Mfg.................	-0.0053	2.50	22	31
35. Furniture Mfg	.0421	2.30	10	34
36. Other Paper Converters.........	.0036	3.04	19	23
37. Railroad Rolling Stock	-0.2173	2.69	40	26
38. Rubber Industry................	-0.0414	3.19	33	18
39. Shoe Factories & Repair	-0.0476	1.72	34	39
40. Shipbuilding & Repair..........	-0.0770	3.08	37	21

Source: All data for this and subsequent tables are from the Dominion Bureau of Statistics. See Appendix II.

TABLE 2

A COMPARISON OF THE RANKS OF THE GROWTH RATES OF SHARES OF EMPLOYMENT AND THE CORRESPONDING ABSOLUTE GROWTH RATES OF WAGE EARNINGS OF MALE PRODUCTION WORKERS - ONTARIO, 1946-1960

Industry	Growth Rates		Ranks	
	Employment Shares	Wage Earnings $	Employment Shares	Wage Earnings $
1. Pulp & Paper Mills	.0369	3.45	9	20
2. Smelting & Refining	.0667	3.72	4	13
3. Petroleum Refining	-0.0291	5.18	30	1
4. Slaughtering & Meat Packing	.0089	3.57	18	17
5. Motor Vehicle Mfg	-0.0613	3.81	35	12
6. Iron & Steel Mills	.1103	4.76	2	2
7. Sawmills (incl. shingles)	-0.1165	2.31	39	36
8. Mfg. of Industrial Chemicals	.0475	4.19	7	5
9. Wire & Wire Products	.0195	3.43	16	21
10. Misc. Food Mfg.	.0259	3.65	13	15
11. Misc. Machinery & Equip.	-0.0093	3.57	23	18
12. Metal Stamping, Pressing & Ornamental & Coating	.0446	3.91	8	9
13. Printing & Publishing	.0249	4.31	14	4
14. Bakeries	-0.0134	2.99	24	29
15. Distilleries	.0018	4.10	19	7
16. Aircraft & Parts Mfg.	.2459	3.04	1	28
17. Fruit & Vegetable Canning	-0.0310	2.89	32	30
18. Butter Cheese, Pasteurizing	.0977	3.20	3	26
19. Cotton Yarn & Cloth	-0.0437	2.25	34	37
20. Men's Clothing Factories	-0.0193	1.81	26	40
21. Women's Clothing Factories	-0.0259	1.86	28	39
22. Breweries	-0.0197	4.04	27	8
23. Electrical Apparatus & Supplies	.0516	3.45	6	19
24. Synthetic Textile Mills	.0276	2.41	12	35
25. Motor Vehicle Supplies	-0.0734	3.64	37	16
26. Sash & Door Planing Mills (excl. hardwood flooring)	-0.0287	2.50	29	33
27. Printing & Bookbinding	.0281	3.87	11	11
28. Tobacco Products	.0017	4.38	20	3
29. Agricultural Implements	-0.2352	3.68	40	14
30. Flour & Feed Mills	-0.0336	2.44	33	34
31. Paper Boxes & Bags	.0292	3.87	10	10
32. Mfg. of Pharmaceuticals & Medicines	-0.0036	3.18	21	27
33. Fabricated Structural Metal	.0594	4.12	5	6
34. Soft Drink Mfg.	-0.0083	2.86	22	31
35. Furniture Mfg.	.0131	2.67	17	32
36. Other Paper Converters	.0195	3.36	15	22
37. Railroad Rolling Stock	-0.0929	3.21	38	24
38. Rubber	-0.0660	3.26	36	23
39. Shoe Factories & Repair	-0.0190	2.10	25	38
40. Shipbuilding & Repair	-0.0308	3.20	31	25

TABLE 3

A COMPARISON OF THE RANKS OF THE GROWTH RATES OF SHARES OF EMPLOYMENT AND THE CORRESPONDING ABSOLUTE GROWTH RATES OF WAGE EARNINGS OF MALE PRODUCTION WORKERS - METROPOLITAN AREA OF MONTREAL, 1948-1960

Industry	Growth	Rates	Ranks	
	Employment Share	Wage Earnings $	Employment Share	Wage Earnings $
1. Pulp and Paper Mills	.0368	2.97	6	9
2. Smelting and Refining.........	.0338	2.33	7	11
3. Petroleum Refining...........	.0479	2.82	5	10
4. Slaughtering and Meat Packing.	.0015	3.95	9	1
5. Motor Vehicle Mfg.	.0082	3.02	8	7
6. Iron and Steel Mills	-0.0622	1.80	10	14
7. Sawmills (incl. shingles)......	-0.0774	2.14	13	12
8. Mfg. of Industrial Chemicals..	.0536	2.00	4	13
9. Fish Products Industry	.0629	3.14	3	4
10. Misc. Food Mfg.	.1664	3.91	1	3
11. Misc. Machinery............	-0.0770	3.15	12	2
12. Metal, stamping, pressing....	-0.2862	3.01	14	8
13. Printing and Publishing.......	.1587	3.05	2	6
14. Bakeries....................	-0.0669	3.11	11	5

test. Such factors as the non-homogeneity of production workers, the possible role of non-wage conditions of employment, the cost of movement of workers, ignorance of the going wage in a wide range of industries, and the age and marital status of workers, may be instanced as important factors which could have adversely affected the findings. Aside from these more obvious reasons there seem to be other pertinent factors which could have accounted for the failure of the hypothesis. It is conceivable that some manufacturing industries may be more directly competitive in the labour market with industries in other sectors of the economy than with other manufacturing industries. The existence of intersectoral mobility of this kind could well affect the findings of the test. Another factor which may be cited as having an adverse effect on the findings is the labour market behaviour of immigrant labour. In the post-war period, immigrants contributed largely to the growth of the Canadian labour force. It seems reasonable to suppose that because a sizeable percentage of these immigrants are accustomed to somewhat lower wages in their country of origin they would tend to compare and assess the adequacy of the wages offered them in any industry in Canada with what they would have been paid for a similar job in their own country. Thus ignorance of Canadian labour market conditions may cause a significant part of the immigrant labour force, and even indigenous workers, to work for wages which are below their opportunity costs.

There may be other valid reasons which could be advanced to account for the apparent inadequacy of the predictive power of the hypothesis. However,

rather than continuing to catalogue these reasons it seems more advantageous to re-examine the implications of the hypothesis. The hypothesis states that the relative growth rate of employment shares is a function of the relative growth of wage-earnings. This functional relationship implicitly overlooks the possible importance to the worker of the level of wage-earnings in the base year. Therefore, a more realistic hypothesis should take cognizance not only of the absolute growth rates but also the actual wage-level. In order to take into account the possible significance of the relative wage-level, we will now introduce two additional hypotheses.

The first of these subsidiary hypotheses is 'the relative (ranks) growth rates of employment shares is a function of the relative average weekly wage-earnings over the period'. Placed in the framework of the previous hypothesis, it may be written as:

$$\overline{W}_1 \geqslant \overline{W}_2 \geqslant \overline{W}_3 \Leftrightarrow \frac{dE_{s1}}{dt} \geqslant \frac{dE_{s2}}{dt} \geqslant \frac{dE_{s3}}{dt}$$

where $\overline{W}_1$, $\overline{W}_2$ and $\overline{W}_3$ represent the annual average weekly wage-earnings of industries 1, 2, and 3 over the period.

The second subsidiary hypothesis states that 'the relative position of the average employment share of an industry over the period is directly related to that industry's annual average weekly wage-earnings'. That is to say,

$$\overline{W}_1 \geqslant \overline{W}_2 \geqslant \overline{W}_3 \Leftrightarrow \bar{E}_{s1} \geqslant \bar{E}_{s2} \geqslant \bar{E}_{s3}$$

A test of these two hypotheses - the results of which are shown in Tables 4 and 5 - fails to indicate a significant pattern of correspondence between W and

TABLE 4

COMPARISON OF RANKS OF THE AVERAGE GROWTH RATES OF EMPLOYMENT SHARES (E_s) AND THE AVERAGE WEEKLY WAGE EARNINGS (W)

Industry No.	CANADA (1946-1961)		ONTARIO (1946-1960)		MONTREAL (1948-1960)	
	E_s	W	E_s	W	E_s	W
1	3	2	9	4	6	7
2	2	5	4	7	7	12
3	16	1	30	2	5	10
4	18	13	18	15	9	2
5	36	6	35	6	8	3
6	11	4	2	1	10	14
7	39	33	39	40	13	13
8	8	3	7	5	4	11
9	21	40	16	11	3	9
10	17	25	13	28	1	1
11	35	18	23	20	12	4
12	25	16	8	17	14	6
13	13	7	14	3	2	5
14	14	31	24	31	11	8
15	20	12	19	13		
16	1	10	1	10		
17	28	39	32	34		
18	4	29	3	30		
19	7	27	34	36		
20	29	32	26	32		
21	26	24	28	27		
22	31	8	27	8		
23	6	9	6	18		
24	27	30	12	26		
25	38	35	37	12		
26	30	37	29	39		
27	15	19	11	19		
28	24	14	20	24		
29	12	15	40	14		
30	32	28	33	33		
31	9	23	10	22		
32	23	26	21	29		
33	5	11	5	9		
34	22	36	22	37		
35	10	34	17	35		
36	19	22	15	23		
37	40	21	38	21		
38	33	17	36	16		
39	34	38	25	38		
40	37	20	31	25		

TABLE 5

COMPARISON OF RANKS OF THE AVERAGE EMPLOYMENT SHARE (E_s) AND AVERAGE WEEKLY WAGE EARNINGS (W)

Industry No.	CANADA (1946-1961)		ONTARIO (1946-1960)		MONTREAL (1948-1960)	
	E_s	W	E_s	W	E_s	W
1	1	2	5	4	12	7
2	10	5	13	7	13	12
3	26	1	1	2	7	10
4	14	13	19	15	9	2
5	7	6	3	6	14	3
6	4	4	4	1	10	14
7	2	33	18	40	6	13
8	33	3	29	5	3	11
9	25	40	24	11	11	9
10	37	25	36	28	5	1
11	6	18	6	20	2	4
12	11	16	8	17	1	6
13	17	7	17	3	4	5
14	9	31	11	31	8	8
15	39	12	39	13		
16	13	10	14	10		
17	28	39	21	34		
18	12	29	15	30		
19	30	27	25	36		
20	23	32	30	32		
21	29	24	35	27		
22	31	8	34	8		
23	3	9	2	18		
24	22	30	32	26		
25	19	35	7	12		
26	16	37	22	39		
27	20	19	16	19		
28	38	14	40	24		
29	32	15	10	14		
30	36	28	31	33		
31	27	23	23	22		
32	40	26	38	29		
33	24	11	26	9		
34	34	36	37	37		
35	8	34	9	35		
36	35	22	28	23		
37	5	21	20	21		
38	18	17	12	16		
39	21	38	27	38		
40	15	20	33	25		

$\frac{dE_s}{dt}$ or $\overline{W}$ and $\bar{E}_s$. The absence of the anticipated patterns of association derives, we presume, from the fact that the averaging of W and E_s over a period, which was characterized by significant cyclical fluctuations, has tended to subsume pronounced shifts in the relative positions of $\overline{W}$ and $\bar{E}_s$ or $\frac{dE_s}{dt}$.

PRINCIPAL TEST

The foregoing results force us to advance the principal hypothesis in this part. This hypothesis seeks not only to capture the annual shifts in the ranked order of W and E_s, but also to take into account the nature of the association between the variables during the peaks and troughs of the business cycle. This can be achieved by introducing a new technique which will trace the directional changes of the shifts in the relative position of W and E_s from year to year and with reference to their relative positions in a base year, namely 1946. Hence, the final hypothesis in this section states that 'the annual directional changes in the relative position of the employment shares of one industry depends on the corresponding directional change in the relative position of that industry's wages'.

The technique used to test this hypothesis is straight forward. First, the wages and employment shares of all industries are ranked for each of the years 1946 to 1960. (See Tables 6 and 7) These ranks which indicate the relative positions of each industry's wages and employment shares throughout the period are now used as data for ascertaining both the secular and cyclical movements of the ranks. The cyclical movements are determined by comparing the directional changes of the ranks on a year to year basis (see Tables 8 and 9) while the secular trends merely imply the comparison of ranks in each year with their respective ranks in the base year 1946 (see Tables 10 and 11). In both cases where an industry's relative position moves upward or has remained the same, such a

TABLE 6

RANKS OF ANNUAL AVERAGE WEEKLY WAGE EARNINGS AND EMPLOYMENT SHARES IN FORTY LEADING MANUFACTURING INDUSTRIES - CANADA 1946-1961

Industry	Industry	1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960		1961	
		Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings
1.	Pulp and paper mills	2	2	2	2	2	2	2	2	2	1	2	1	1	2	1	2	1	2	1	3	1	3	1	5	1	7	1	7	1	6	1	5
2,	Smelting and refining	15	6	12	4	11	4	11	4	10	4	10	3	11	3	11	4	10	3	6	4	7	6	10	4	9	5	7	6	6	5	5	6
3.	Petroleum Refining	27	11	27	6	27	5	27	8	27	3	28	2	28	1	28	1	26	1	27	1	28	1	26	1	24	1	27	1	30	1	30	1
4.	Slaughtering and meat packing	12	15	14	15	15	12	15	10	15	11	17	11	15	13	15	18	16	14	14	15	15	15	14	16	14	15	14	12	13	11	11	14
5	Motor vehicle manufacturing	8	12	7	3	7	3	6	5	6	2	6	5	6	5	6	3	11	11	5	7	6	9	9	9	12	4	10	4	9	3	12	3
6	Iron and steel mills	5	5	5	7	5	9	5	3	5	5	5	6	5	4	5	6	5	8	4	2	5	2	4	2	5	2	4	2	4	2	4	2
7	Sawmills (including shingles)	1	36	1	34	1	34	1	34	1	34	1	33	2	33	2	33	2	32	2	32	2	33	2	32	2	32	2	36	2	32	3	32
8	Manufacture of industrial chemicals	32	14	33	5	34	8	33	6	35	7	33	4	33	7	33	8	33	4	33	6	34	4	32	3	29	3	30	3	21	4	20	4
9	Fish products industries	24	38	25	39	24	40	24	40	24	40	23	40	25	40	26	40	24	40	24	40	27	40	28	40	26	40	25	40	28	40	28	40
10	Miscellaneous food manufacturing	37	30	37	33	37	26	37	27	37	24	37	29	37	29	37	25	37	25	37	25	37	25	36	25	36	25	36	24	36	25	36	25
11	Miscellaneous machinery	6	19	6	16	6	20	7	23	8	20	7	19	7	16	8	17	8	19	10	19	9	16	6	19	10	20	9	20	10	18	10	18
12	Metal stamping, pressing	10	21	11	17	10	19	10	14	11	16	11	14	13	17	13	14	12	13	12	16	13	18	13	13	13	16	11	16	11	15	13	15
13	Printing and publishing	20	10	19	9	18	6	16	7	17	6	18	8	17	8	17	5	17	6	17	5	18	7	18	6	16	6	16	5	15	8	15	7
14	Bakeries	7	29	8	30	9	32	9	32	9	31	9	32	9	32	10	30	9	31	9	31	11	30	11	30	8	29	6	28	7	30	7	30
15	Distilleries	40	20	40	22	40	18	40	13	40	14	39	17	38	18	38	23	38	15	38	13	38	14	38	11	39	11	40	10	40	9	40	9
16	Aircraft and parts manufacturing	21	3	26	10	29	16	25	15	25	9	16	10	8	12	7	7	6	5	11	9	12	11	5	10	6	10	12	9	12	13	9	12
17	Fruit and vegetable canning	22	40	23	38	23	36	28	38	28	38	27	36	29	36	30	36	30	36	29	36	31	36	29	35	30	33	32	35	31	35	31	34
18	Butter, cheese, pasteurizing	13	28	16	32	13	33	12	33	14	33	14	30	16	30	16	32	15	29	15	29	17	28	12	26	4	26	8	27	8	28	8	29
19	Veneer and plywood	34	26	34	25	35	25	36	29	32	30	32	25	32	28	29	27	29	26	28	26	25	27	27	28	25	28	23	30	26	26	26	27
20	Men's Clothing factories	25	23	22	20	22	27	22	26	22	25	24	31	21	31	22	31	23	33	26	33	29	32	25	34	27	35	28	34	29	36	29	33
21	Women's clothing factories	28	4	26	21	25	11	23	16	23	27	26	24	27	24	27	26	28	28	30	27	32	26	30	29	31	27	31	26	32	29	32	28
22	Breweries	26	17	24	13	26	15	26	11	26	19	30	9	30	6	31	10	31	9	37	8	33	12	33	8	33	9	33	8	33	7	33	8
23	Electrical apparatus and supplies	4	1	3	1	3	1	3	1	3	10	3	13	3	11	3	13	3	12	3	14	3	5	3	12	3	13	3	19	3	17	2	19
24	Synthetic textile mills	23	33	21	31	21	28	21	25	19	26	21	28	23	26	24	28	27	27	23	28	26	29	24	27	23	31	24	31	25	31	24	31
25	Cotton yarn and cloth	16	32	15	35	16	31	14	31	12	32	12	34	18	34	18	35	24	34	20	35	21	35	21	38	21	39	21	38	23	37	21	38
26	Sash and door planing mills	17	37	17	37	14	37	13	36	13	37	13	37	14	39	27	38	14	27	13	17	14	37	16	37	17	37	17	37	16	38	16	37
27	Printing and bookbinding	19	22	20	18	19	21	18	21	18	18	20	22	20	21	20	21	18	18	18	18	20	19	17	20	15	14	15	14	17	16	19	17
28	Tobacco products	38	31	38	29	38	22	38	17	38	17	38	15	39	9	39	11	39	10	39	11	39	13	39	15	38	12	38	13	37	10	37	10
29	Wire and wire products	33	18	32	14	32	17	31	9	29	13	31	12	31	14	32	19	32	16	31	12	30	10	31	14	32	18	29	17	27	14	27	13
30	Flour and feed mills	29	27	29	28	31	30	34	28	36	29	36	27	36	25	36	29	36	30	36	30	37	31	37	31	37	30	37	29	38	23	38	24
31	Miscellaneous metal fabricating	30	25	31	19	30	24	35	24	34	22	25	21	24	19	23	12	22	20	25	21	23	21	23	21	28	24	26	23	22	22	23	22
32	Manufacture of pharmaceuticals	39	39	39	27	39	29	39	30	39	28	40	26	40	27	40	24	40	24	40	24	40	24	40	24	40	22	39	25	39	27	39	26
33	Fabricated structural metal	31	13	30	24	28	13	30	20	30	8	29	7	26	10	25	9	25	7	22	1	22	8	20	7	20	8	20	11	20	12	22	11
34	Soft drink manufacturing	36	35	35	40	33	38	29	39	31	36	35	38	34	37	34	37	34	38	35	38	35	38	35	36	35	36	35	32	35	33	35	35
35	Furniture manufacturing	11	34	9	33	8	35	8	35	7	35	8	35	10	35	9	34	7	35	7	34	10	34	8	33	7	34	5	33	5	34	6	36
36	Other paper converters	35	24	36	23	36	23	32	22	33	12	34	18	35	22	35	22	35	23	34	1	36	23	34	21	34	23	34	22	34	21	34	21
37	Railroad rolling stock	3	7	4	11	4	7	4	12	4	21	4	20	4	20	4	16	4	22	8	22	8	22	7	22	11	21	13	21	14	24	14	23
38	Rubber industry	14	16	13	12	17	14	17	19	16	15	15	16	19	15	19	15	19	21	19	17	19	17	19	18	19	19	18	18	19	19	18	16
39	Shoe factories and repair	18	8	18	36	20	39	19	37	20	39	22	39	22	38	21	39	21	39	21	39	21	39	24	39	22	38	22	39	24	39	25	39
40	Shipbuilding and repair	19	9	10	8	12	10	20	18	21	23	19	23	12	23	12	20	13	17	16	23	16	20	16	17	18	17	19	15	18	20	17	20

TABLE 7

RANKS OF ANNUAL AVERAGE WEEKLY WAGE EARNINGS AND EMPLOYMENT SHARES IN FORTY LEADING MANUFACTURING INDUSTRIES - ONTARIO 1946-1960

Industry	Industry	1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960	
		Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings	Employment Shares	Wage Earnings
1	Pulp and paper mills	4	3	4	1	5	1	4	2	5	2	4	2	4	5	5	6	4	5	4	3	4	5	4	7	4	6	4	10	4	9
2	Smelting and refining	15	8	13	8	13	5	13	3	12	5	12	11	13	8	13	8	12	4	12	6	12	6	11	4	15	9	13	9	10	14
3	Petroleum refining	27	5	27	9	25	10	27	8	28	7	31	4	31	3	31	1	30	1	30	4	31	3	31	1	33	1	32	1	33	2
4	Slaughtering and meat packing	17	14	18	13	18	11	18	16	17	18	19	17	18	15	18	16	17	18	17	18	17	13	17	21	17	16	16	11	16	17
5	Motor vehicle manufacturing	1	9	1	3	2	4	2	6	2	1	2	9	2	9	2	2	2	12	1	10	2	9	2	11	2	5	3	6	3	7
6	Iron and steel mills	3	2	3	4	3	2	3	1,	3	4	3	5	3	4	3	7	3	8	3	1	3	1	3	2	3	2	2	2	2	1
7	Sawmills (incl. shingles)	12	40	12	39	12	39	12	38	13	40	13	40	14	39	14	40	16	40	16	40	16	40	19	40	21	40	22	32	23	40
8	Manufacture of industrial chemicals	28	6	29	5	32	6	33	4	30	8	30	6	30	6	30	10	29	7	29	7	27	7	27	6	25	4	24	3	17	3
9	Wire and wire products	25	16	24	12	23	17	24	7	21	11	23	1	24	13	24	17	24	13	23	9	21	10	23	17	23	20	20	17	19	18
10	Miscellaneous food manufacturing	38	37	38	35	37	29	35	34	34	30	34	29	35	29	36	14	34	28	32	27	33	26	32	28	32	28	31	25	29	24
11	Miscellaneous machinery and equipment	5	17	5	19	6	22	6	22	7	21	6	19	6	20	6	19	6	21	5	20	5	15	5	12	5	22	5	18	6	20
12	Metal stamping, pressing	8	25	9	25	8	26	9	18	9	23	8	3	8	23	8	20	9	15	9	21	8	18	9	20	9	21	8	16	5	5
13	Printing and publishing	19	4	19	7	17	7	17	5	15	3	15	7	17	7	17	4	15	2	15	2	14	2	16	3	16	3	15	4	15	4
14	Bakeries	10	30	11	30	11	31	10	31	11	33	11	32	11	33	11	32	10	31	10	31	11	31	12	30	11	31	10	30	8	26
15	Distilleries	39	20	39	20	39	21	39	17	39	16	39	18	39	22	38	25	38	17	39	14	38	23	39	9	39	13	39	7	39	8
16	Aircraft and parts manufacturing	37	12	36	11	36	13	30	9	27	10	18	8	10	1	7	5	5	3	8	8	9	11	7	10	6	10	17	22	18	31
17	Fruit and vegetable canning	18	31	17	38	19	36	21	37	22	37	20	38	20	38	22	36	21	34	21	23	20	35	21	33	19	33	19	33	22	29
18	Butter, cheese, pasteurizing	13	26	14	29	16	32	14	32	16	32	17	25	19	32	19	31	18	29	18	30	18	30	10	26	10	29	9	28	9	27
19	Cotton yarn and cloth	23	34	22	33	21	34	20	29	20	34	22	33	22	35	21	38	23	36	24	35	25	32	26	37	27	39	29	38	32	35
20	Men's clothing factories	26	21	26	14	26	23	25	23	26	26	28	30	27	31	27	30	27	32	28	32	30	33	29	32	30	36	30	35	30	36
21	Women's clothing factories	30	1	33	2	33	3	29	28	29	20	32	23	32	11	32	29	36	30	34	29	35	29	35	31	37	30	36	29	36	30
22	Breweries	33	11	28	15	31	12	31	15	35	12	35	12	33	2	33	3	31	6	31	5	32	8	33	8	34	7	33	15	35	6
23	Electrical apparatus and supplies	2	23	2	18	1	16	1	14	1	13	1	16	1	14	1	18	1	11	2	19	1	14	1	16	1	15	1	19	1	21
24	Synthetic textile mills	34	27	34	23	34	14	37	11	36	14	33	22	36	17	35	22	35	14	35	16	29	24	30	14	29	24	27	40	27	37
25	Motor vehicle supplies	7	19	7	16	7	15	7	13	4	6	5	13	5	12	4	12	7	10	6	11	6	21	6	15	7	14	6	14	11	12
26	Sash and door planing mills (Ex. Hardwood Flooring)	20	39	20	37	20	38	19	36	19	39	21	36	21	40	20	39	20	39	20	38	22	38	24	39	22	37	23	37	26	38
27	Printing and bookbinding	16	24	15	26	15	20	15	20	14	19	14	20	15	21	15	21	14	16	14	15	13	16	14	18	14	11	14	12	14	16
28	Tobacco products	40	38	40	36	40	28	40	21	40	29	40	28	40	24	40	27	40	26	40	25	40	27	40	27	40	17	40	5	40	13
29	Agricultural implements	6	18	6	24	4	18	5	12	6	17	7	15	7	10	10	11	13	25	13	17	15	17	15	22	13	12	11	13	13	15
30	Flour and feed mills	21	33	21	32	28	33	32	33	32	25	36	31	34	34	34	33	33	35	32	36	34	36	34	35	35	34	35	31	24	33
31	Paper boxes and bags	24	29	23	28	[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23	[illegible]	[illegible]	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	Manufacture of pharmaceuticals	36	28	37	27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39	27	[illegible]	28	30	28	38	[illegible]	38	27	[illegible]	[illegible]	[illegible]	[illegible]
33	Fabricated structural metal	32	15	31	17	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9	25	[illegible]	24	4	18	5	[illegible]	8	[illegible]	[illegible]	[illegible]	11
34	Soft drink manufacturing	35	35	35	40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37	[illegible]	37	37	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	34	[illegible]	[illegible]
35	Furniture manufacturing	11	36	10	34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	[illegible]	7	[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	Other paper converters	31	22	30	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37	Railroad rolling stock	14	7	16	10	14	[illegible]	[illegible]	[illegible]	18	4	[illegible]	27	[illegible]	[illegible]	[illegible]	15	19	[illegible]	14	[illegible]	14	22	[illegible]	19	[illegible]	[illegible]	28	[illegible]	31	[illegible]
38	Rubber	9	13	8	6	[illegible]	[illegible]	[illegible]	19	10	[illegible]	[illegible]	14	[illegible]	18	[illegible]	13	11	[illegible]	11	13	10	[illegible]	13	[illegible]	[illegible]	18	[illegible]	[illegible]	[illegible]	19
39	Shoe factories and repair	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	28	37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	37	24	31	[illegible]	34	[illegible]	[illegible]	[illegible]

shift is denoted by a plus sign. Conversely, where the ranks are lower than in a previous year the directional changes of these shifts are designated by minus signs.

The important common feature emerging from both the cyclical and secular tests of the hypothesis is the presence of four distinct categories within which the industries fall.

These are:

1) A relative increase in wages is accompanied by a relative increase in employment shares ($W^+E_s^+$).

2) A relative decrease[22] in wages is associated with a relative decrease in employment shares ($W^-E_s^-$).

3) A relative decrease in wages is accompanied by a relative increase in employment shares ($W^-E_s^+$).

4) A relative increase in wages is associated with a relative decrease in employment shares ($W^+E_s^-$).

The outcome of this test can be more readily seen in terms of the following matrix.

$$
\begin{array}{c|c|c|}
 & E_s^+ & E_s^- \\
\hline
W^+ & x_{11} & x_{12} \\
\hline
W^- & x_{21} & x_{22} \\
\hline
\end{array}
$$

---

(22) It is significant to note that whereas absolute wages in all industries have been increasing over the period, in some industries wages have been declining relatively.

The theory of wages and labour allocation offers a straightforward explanation of the occurrence of $W^+E_s^+$ and $W^-E_s^-$. The cases $W^+E_s^-$ and $W^-E_s^+$ cannot, however, be satisfactorily accounted for solely in terms of the conventional theory. These cases are best understood when examined within the context of the more all-inclusive theory of value of which the theory of wages and labour allocation is but a part. One possible explanation of the case $W^+E_s^-$ is that rising labour productivity and trade union pushfulness have caused some industries to increase their relative wages substantially without there being any desire to increase their share of the available labour supply. This assumed increase in labour productivity may in part be due to increasing capital intensification and better managerial controls. On the other hand, $W^+E_s^-$ may also arise because although the relative employment shares of an industry may be declining, yet its relative share of particular skills may be increasing considerably. Thus $W^+E_s^-$ may be quite compatible with $W^+E_s^+$ and hence quite consistent with the implications of the theory had the test been in terms of specific skills with workers of roughly similar quality.

In cases where relative decreases in wages are accompanied by relative increases in employment shares ($W^-E_s^+$) this would seem to suggest that these relative increases in employment shares could only have arisen because of the absence of employment opportunities in those industries in which the relative position of wages was increasing. Even under full employment conditions where labour shortages force employers to up-grade their less efficient skilled work-

ers, there will always be a large number of workers who are unemployed. These unemployed workers are mainly technologically displaced workers - technologically displaced in the sense that they do not possess the requisite skills, qualifications or basic competence to compete effectively in the labour market. Consequently, when these workers lose their jobs similar occupational employment opportunities are virtually non-existent for them elsewhere in the economy. In many cases, therefore, they are obliged to accept any job which offers them any wage which is slightly in excess of what would have accrued to them from social welfare payments.

Since the *technologically displaced workers* cannot effectively compete in the labour market - they should not therefore be considered as an effectual part of the labour supply. Thus whereas they are in the labour force their services are not really in effective demand even though there is ample evidence of excess demand throughout the labour market as a whole. Hence it is reasonable to infer that technologically displaced workers are redeployed among industries mainly through the existence of employment opportunities rather than wage movements regardless of the business cycle. From this it may be implied that the Keynesian explanation of increases in the price-level between full-employment and under-employment may be valid because a significant part of the unemployed in the neighborhood of the critical level comprise workers whose skills have been rendered useless by technological changes. But since the Keynesian model assumed technology as given[23] Keynes' explanation of price-level increases is

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(23) J.M. Keynes, *The General Theory of Employment Interest and Money*, Macmillan & Co. Ltd., London, 1964, p. 245.

likely to be valid in the short-run if unemployment is mainly the direct outcome of a shortfall in aggregate demand and not a result of changes in the industrial structure occassioned by technological changes. Therefore Keynes' assumption overlooked the growing importance of technological unemployment which has become a characteristic feature of the 1950's and particularly the 1960's.

In equating unemployment rates with the level of business activity Phillips implicitly assumed that unemployment is basically a function of aggregate demand. This of course is not altogether correct because the unemployed is also made up of technologically displaced workers. Hence unemployment rates become a reliable index of business activity only after an appropriate correction has been made for the technologically displaced workers who are still in the labour force. If this contention is correct, then it follows that rapid technological changes and the attendant rapid obsolescence of skills may so alter the skill-mix requirements of most economies as to create considerable variations in the critical level of unemployment within and among countries, even in the short-term.

Broadly speaking the empirical findings indicate that wages do allocate manpower among industries. This is so because by far the greatest percentage of industries falls within the two categories where relative increases in wages are associated with relative increases in employment shares (W^+E^+s) and conversely where relative decreases in wages are accompanied by relative decreases in employment shares (W^-E^-s). At the same time the tests disclose the phenomenon where relative decreases in wages are associated with relative increases in em-

ployment shares (W^-E^+s). This later category would seem to suggest that a significant part of the effective labour supply is allocated at all times mainly through the existence of employment opportunities.

At this stage we will examine the relation of wage movements and manpower flows among industries during various phases of the business cycle. (See Tables 8 and 9) It is widely held, though not fully substantiated, that during a recession when unemployment rates are increasing and even highly skilled labour is in excess supply, many skilled workers are forced to accept relatively low rates of pay in order to procure employment. Consequently, we are led to expect that the contractionary phase of the business cycle will be characterised in many industries by the phenomenon of decreasing relative wages being associated with increases in their relative shares of employment. Such a situation would be consistent with marked increases in the number of industries falling within the category $W^-E_s^+$. We may now ask to what extent is this borne out by our findings?

A close examination of the finding reveals two interesting phenomena. First, a significant proportion of the industries reviewed falls within the category $W^-E_s^+$ throughout all the phases of the business cycle. On average about 25% of the leading manufacturing industries in Canada and 30% of those in Ontario fell within the category $W^-E_s^+$. Furthermore, the number of industries falling within this group increased during the trough of the cycle. (See Chart I) These findings would therefore seem to indicate that employment opportunities do act as an allocative device throughout the various stages of the business cycle, but tend

TABLE 8

COMPARISON OF YEAR TO YEAR DIRECTIONAL* CHANGES IN THE RANKS OF EMPLOYMENT SHARES AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS IN EACH OF FORTY LEADING MANUFACTURING INDUSTRIES: CANADA 1946-1960

Industry No.	Industry	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	+W		–W	
																++	–+	++	––
1.	Pulp & Paper Mills	++	++	++	++	++	+–	++	++	+–	++	+–	+–	++	++	10	–	4	–
2.	Smelting & Refining	++	++	++	++	++	–+	+–	++	+–	––	–+	+–	+–	++	7	2	4	1
3.	Petroleum Refining	++	++	+–	++	–+	++	++	++	–+	–+	++	++	–+	–+	8	5	1	–
4.	Slaughtering & Meat Packing	–+	–+	++	+–	–+	+–	+–	–+	+–	–+	+–	++	++	++	4	5	5	–
5.	Motor Vehicle Mfg.	++	++	+–	++	+–	++	++	––	++	––	–+	–+	++	++	8	2	2	2
6.	Iron & Steel Mills	+–	+–	++	+–	+–	++	+–	+–	++	–+	++	–+	++	++	6	2	6	–
7.	Sawmills (incl. Shingles)	++	++	++	++	++	–+	++	++	++	+–	++	++	+–	++	11	1	2	–
8.	Manuf. of Ind. Chemicals	–+	––	++	––	++	+–	+–	++	+–	–+	++	++	–+	+–	5	3	4	2
9.	Fish Products Industries	––	+–	++	++	++	–+	–+	++	++	–+	–+	++	++	–+	7	5	1	1
10.	Misc. Food Mfg.	+–	++	+–	++	+–	++	++	++	++	++	++	++	++	+–	10	–	4	–
11.	Misc. Machinery	++	+–	––	–+	++	++	––	+–	–+	++	+–	–+	++	–+	5	4	3	2
12.	Metal Stamping, Pressing	–+	+–	++	––	++	––	++	++	+–	––	++	+–	++	++	7	1	3	3
13.	Printing and Publishing	++	++	+–	–+	––	++	++	+–	++	––	++	++	++	+–	8	1	3	2
14.	Bakeries	––	––	++	++	+–	++	–+	+–	++	–+	++	++	++	––	7	2	2	3
15.	Distilleries	+–	++	++	+–	+–	+–	+–	++	++	+–	++	–+	–+	++	6	2	6	–
16.	Aircraft & Parts Mfg.	––	––	++	++	+–	+–	++	++	––	––	++	–+	–+	+–	5	2	3	4
17.	Fruit & Vegetable Canning	–+	++	––	++	++	–+	–+	++	++	–+	++	–+	––	++	7	5	–	2
18.	Butter, Cheese, Pasteurizing	––	+–	++	–+	++	–+	+–	++	++	–+	++	++	––	+–	6	3	3	2
19.	Veneer & Plywood	++	–+	––	+–	++	+–	++	++	++	+–	––	++	+–	–+	6	2	4	2
20.	Men's Clothing Factories	++	+–	++	++	––	++	–+	––	–+	–+	+–	––	–+	––	4	4	2	4
21.	Women's Clothing Factories	+–	++	+–	+–	–+	–+	+–	––	–+	–+	+–	–+	++	––	2	5	5	2
22.	Breweries	++	––	++	+–	–+	++	––	++	–+	+–	++	+–	++	++	7	2	3	2
23.	Electrical Apparatus & Supplies	++	++	++	+–	+–	++	+–	++	+–	++	+–	+–	+–	++	7	–	7	–
24.	Synthetic Textile Mills	++	++	++	+–	––	–+	––	–+	+–	––	++	+–	–+	–+	4	4	3	3
25.	Cotton Yarn & Cloth	+–	–+	++	+–	+–	–+	+–	–+	+–	–+	+–	+–	++	–+	2	5	7	–
26.	Sash & Door Planing Mills (Excl. Hardwood Flooring)	++	++	++	+–	++	––	–+	++	+–	–+	–+	–+	++	+–	6	4	3	1
27.	Printing & Bookbinding	–+	+–	++	++	––	++	++	++	++	––	+–	++	++	––	8	1	2	3
28.	Tobacco Products	++	++	++	++	++	–+	+–	++	+–	+–	+–	++	+–	++	8	1	5	–
29.	Wire & Wire Products	++	+–	++	+–	–+	+–	––	++	++	++	––	––	–+	++	6	2	3	3
30.	Flour & Feed Mills	+–	––	–+	––	++	++	+–	+–	++	––	++	++	++	–+	6	2	3	3
31.	Misc. Metal Fabricating	–+	+–	–+	++	++	++	++	+–	–+	+–	++	––	++	++	7	3	3	1
32.	Manuf. of Pharmaceuticals	++	+–	+–	++	–+	+–	++	++	++	++	++	++	+–	+–	8	1	5	–
33.	Fabricated Structural Metal	+–	++	––	++	++	+–	++	++	+–	++	++	+–	+–	+–	7	–	6	1
34.	Soft Drink Mfg.	+–	++	+–	–+	––	++	++	+–	–+	++	++	++	++	+–	7	2	4	1
35.	Furniture Mfg.	++	+–	++	++	–+	–+	++	+–	++	–+	++	+–	++	+–	7	3	4	.
36.	Other Paper Converters	–+	++	++	–+	––	––	++	+–	++	––	++	+–	++	++	7	2	2	3
37.	Railroad Rolling Stock	––	++	+–	+–	++	++	++	+–	–+	++	++	–+	–+	––	6	3	3	2
38.	Rubber Industry	++	––	+–	++	+–	–+	++	+–	++	++	+–	+–	++	––	6	1	5	2
39.	Shoe Factories and Repair	+–	––	++	––	–+	++	+–	++	++	++	–+	++	+–	–+	6	3	3	2
40.	Shipbuilding & Repair	++	––	––	––	++	++	++	–+	––	++	++	–+	–+	+–	6	3	1	4
	$^{+}W^{+}E_s$	19	18	24	18	17	17	19	22	19	12	23	16	21	15	260			
	$^{-}E_s$	7	3	2	5	8	11	5	4	8	13	5	10	9	8		98		
	$^{-}W^{+}E_s$	9	11	9	12	9	9	12	11	11	6	10	11	8	11			139	
	$^{-}E_s$	5	8	5	5	6	3	4	3	2	9	2	3	2	6				63

* First sign refers to change in employment share
Second sign refers to change in wage earnings

TABLE 9

COMPARISON OF THE YEAR TO YEAR DIRECTIONAL* CHANGES IN THE RANKS OF EMPLOYMENT SHARES AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS IN EACH OF FORTY HEADING MANUFACTURING INDUSTRIES:
ONTARIO, 1946-1960

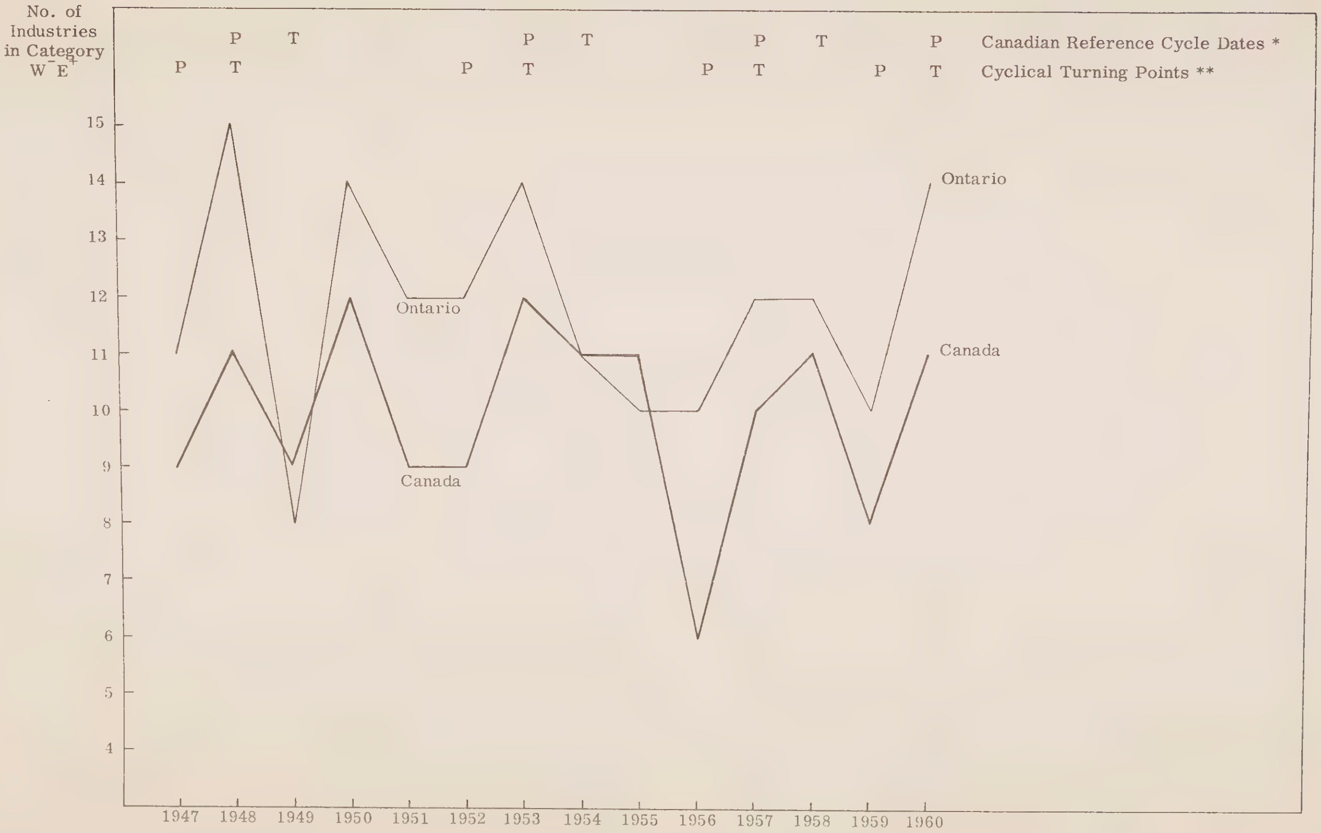
Industry No.	Industry	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	+W		-W	
																++	-+	+-	--
1.	Pulp & Paper Mills	++	-+	+-	-+	++	+-	--	++	++	+-	+-	++	+-	++	6	2	5	1
2.	Smelting & Refining	++	++	++	+-	+-	-+	++	++	+-	++	++	--	++	+-	8	1	4	1
3.	Petroleum Refining	+-	+-	-+	-+	-+	++	++	++	+-	-+	++	-+	++	--	5	5	3	1
4.	Slaughtering & Meat Packing	-+	++	+-	+-	-+	++	+-	+-	++	++	+-	++	++	+-	6	2	6	-
5.	Motor Vehicle Mfg.	++	--	+-	++	+-	++	++	+-	++	-+	+-	++	--	+-	6	1	5	2
6.	Iron & Steel Mills	+-	++	++	+-	+-	++	+-	+-	++	++	+-	++	++	++	8	-	6	-
7.	Sawmills (incl. Shingles)	++	++	++	--	++	-+	+-	-+	++	++	-+	-+	-+	--	6	5	1	2
8.	Manuf. of Ind. Chemicals	-+	--	-+	+-	++	++	+-	++	++	++	++	++	++	++	9	2	2	1
9.	Wire & Wire Products	++	+-	-+	+-	-+	--	+-	++	++	+-	--	+-	++	+-	4	2	6	2
10.	Misc. Food Mfg.	++	++	+-	++	++	-+	-+	+-	++	-+	+-	++	++	++	8	3	3	-
11.	Misc. Machinery & Equipment	+-	--	++	-+	++	+-	++	+-	++	++	++	+-	++	--	7	1	4	2
12.	Metal Stamping, Pressing	-+	+-	-+	+-	++	+-	++	-+	+-	++	--	+-	++	++	5	3	5	1
13.	Printing & Publishing	+-	++	++	++	+-	-+	++	++	++	++	--	++	+-	++	9	1	3	1
14.	Bakeries	-+	+-	++	--	++	+-	++	++	++	-+	-+	+-	++	++	7	3	3	1
15.	Distilleries	++	+-	++	++	+-	+-	+-	++	-+	+-	-+	+-	++	+-	5	2	7	-
16.	Aircraft & Parts Mfg.	++	+-	++	+-	++	++	+-	++	--	--	++	++	--	--	7	-	3	4
17.	Fruit & Vegetable Canning	+-	-+	--	-+	+-	++	-+	++	++	+-	-+	++	++	-+	5	5	3	1
18.	Butter, Cheese, Pasteurizing	--	--	++	-+	-+	--	++	++	+-	++	++	+-	++	++	7	2	2	3
19.	Cotton Yarn & Cloth	+-	+-	++	+-	-+	+-	+-	-+	-+	-+	--	--	-+	-+	1	6	5	2
20.	Men's Clothing Factories	++	+-	++	--	--	+-	++	+-	-+	--	++	--	++	+-	5	1	4	4
21.	Women's Clothing Factories	--	+-	+-	++	--	++	+-	--	++	-+	+-	-+	++	+-	4	2	5	3
22.	Breweries	+-	-+	-	-+	-+	++	+-	+-	++	--	-+	-+	+-	--	3	5	5	1
23.	Electrical Apparatus & Supplies	++	++	++	++	+-	++	+-	++	--	++	+-	++	+-	+-	8	-	5	1
24.	Synthetic Textile Mills	++	++	-+	+-	+-	-+	+-	++	--	+-	-+	+-	+-	++	4	3	6	1
25.	Motor Vehicle Supplies	++	++	++	++	--	++	++	-+	+-	+-	++	-+	++	-+	8	3	2	1
26.	Sash & Door Planing Mills (Excl. Hardwood Flooring)	++	+-	++	+-	-+	+-	++	++	++	-+	--	++	-+	--	6	3	3	2
27.	Printing & Bookbinding	+-	++	++	++	+-	--	++	++	++	+-	--	++	+-	+-	7	-	5	2
28.	Tobacco Products	++	++	++	+-	++	++	+-	++	++	+-	++	++	++	+-	10	-	4	-
29.	Agricultural Implements	+-	++	-+	--	-+	++	--	--	++	-+	+-	++	+-	--	4	3	3	4
30.	Flour & Feed Mills	++	--	-+	++	--	+-	++	+-	+-	-+	++	-+	++	+-	5	3	4	2
31.	Paper Boxes & Bags	++	++	--	+-	-+	--	++	++	++	-+	+-	+-	++	-+	6	3	3	2
32.	Manuf. of Pharmaceuticals	-+	--	++	+-	++	+-	-+	++	+-	-+	+-	++	++	+-	5	3	5	1
33.	Fabricated Structural Metal	+-	+-	+-	-+	+-	+-	-+	++	+-	++	+-	--	-+	+-	2	3	8	1
34.	Soft Drink Mfg.	+-	++	-+	-+	+-	++	++	+-	+-	-+	++	++	--	++	6	3	4	1
35.	Furniture Mfg.	++	+-	+-	++	-+	+-	++	++	++	+-	-+	+-	+-	++	6	2	6	-
36.	Other Paper Converters	++	+-	++	++	++	--	-+	++	++	+-	++	-+	++	++	9	2	2	1
37.	Railroad Rolling Stock	--	++	--	--	+-	++	-+	--	+-	++	-+	-+	--	--	3	3	2	6
38.	Rubber	++	--	--	++	++	--	++	+-	++	++	--	+-	+-	++	7	-	3	4
39.	Shoe Factories & Repair	-+	+-	++	--	-+	-+	+-	+-	++	-+	++	+-	+-	-+	3	5	5	1
40.	Shipbuilding	--	+-	--	+-	++	++	-+	-+	--	++	+-	+-	--	+-	3	2	5	4
	${}^{+}W^{+}E_s$	19	15	19	12	14	16	17	21	23	14	13	16	21	13	233			
	${}^{-}E_s$	6	3	8	8	10	6	7	5	3	13	8	8	4	6		95		
	${}^{-}W^{+}E_s$	11	15	8	14	12	12	14	11	10	10	12	12	10	14			165	
	${}^{-}E_s$	4	7	5	6	4	6	2	3	4	3	7	4	5	7				67

* First sign refers to change in employment share
Second sign refers to change in wage earnings

CHART NO. I

CYCLICAL FLUCTUATIONS IN THE NUMBER OF INDUSTRIES FALLING IN THE CATEGORY W^-E^+: CANADA AND ONTARIO

1947-1960



Source: * Economic Council of Canada.
** Tables 8 and 9.

to be more effective in the trough even though the cyclical down-turns during this period were neither severe nor prolonged. Secondly, in Chart I where we seek to compare the reference dates of Canada's post-war business cycles, and fluctuations in the number of industries in the category $W^{-}E_{S}^{+}$ it can be seen that the turning points of $W^{-}E_{S}^{+}$ consistently lead those of the business cycle by one year. Therefore, we are inclined to feel that $W^{-}E_{S}^{+}$ may well prove to be a sensitive leading indicator of the cyclical turning points for the economy as a whole. On the average it is reasonable to conclude, given the limitations of the technique used in the test, that these findings appear to support the view of some economists that the allocative role of wages is more effective under tight labour market conditions than otherwise.

It now seems possible in the light of the foregoing analysis to hazard a crude measure of the relative tightness of the labour market which may have some worthwhile implications for problems of economic stabilization. The measure is conceptually simple. It states that as the ratio of the number of industries in the category $W^{-}E_{S}^{+}$ to the total number of industries in the system approaches zero, employment opportunities will be a maximum and excess labour supply will therefore approach zero. Going back to the matrix on page 14, tightness T may therefore be expressed algebraically as:

$$T = \left(x_{21} \Big/ \sum_{i,j=1}^{2} xij \right) \longrightarrow 0$$

where x_{21} represents the

number of industries in the group $W^-E_s^+$, and $\sum_{i,j=1}^{2} xij$ is total number of industries in the economy. It is highly improbable, given the imperfections of the market, that T will ever be zero, but one could estimate, in terms of past experience, that value of T which appears to be reasonably consistent with relative price stability. In other words since the critical level is not invariant through time - the best one can hope to do is to establish a range of values for T (in the neighborhood of the peak of the business cycle) within which unwarranted inflationary pressures are likely to be experienced. A priori reasoning suggests that this measure of the tightness of the labour market may be far more revealing if applied at the firm level using deseasonalized data for less spatially difused market areas.

Equally important factors are evidenced in an analysis of the secular trends of the shifts in the relative positions of wages and employment shares among industries over the period. The categories $W^+E_s^+$, $W^+E_s^-$, $W^-E_s^+$ and $W^-E_s^-$ (Tables 10 and 11) seems to conform roughly to industries which can be classified as "expanding labour intensive", "expanding capital intensive", "industries with low quality skill requirements", and "contracting industries", respectively. Since the greatest concentration of manufacturing industries are in Ontario we will confine the analysis to the findings for that province.

TABLE 10

COMPARISON OF DIRECTIONAL* CHANGES IN THE RANKS OF EMPLOYMENT SHARES AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS IN EACH OF FORTY HEADING MANUFACTURING INDUSTRIES WITH REFERENCE TO THE RANKS IN 1946 CANADA, 1946-1960

Industry No.	Industry	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	+W		-W	
																++	-+	+-	--
1.	Pulp & Paper Mills	++	++	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-	8	-	6	-
2.	Smelting & Refining	++	++	++	++	++	++	++	++	++	++	++	++	++	++	14	-	-	-
3.	Petroleum Refining	++	++	+-	++	-+	-+	-+	++	++	-+	++	++	++	-+	8	5	1	-
4.	Slaughtering & Meat Packing	-+	-+	-+	-+	-+	-+	--	-+	-+	-+	--	-+	-+	-+	-	12	-	2
5.	Motor Vehicle Mfg.	++	++	++	++	++	++	++	-+	++	++	-+	-+	-+	-+	9	5	-	-
6.	Iron & Steel Industries	+-	+-	++	++	+-	++	+-	+-	++	++	++	++	++	++	9	-	5	-
7.	Sawmills (incl. Shingles)	++	++	++	++	++	-+	-+	-+	-+	-+	-+	-+	-+	-+	5	9	-	-
8.	Mfg. of Industrial Chemicals	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	++	++	++	++	4	10	-	-
9.	Fish Products Industries	--	+-	+-	+-	+-	--	--	+-	+-	--	--	--	--	--	-	-	6	8
10.	Misc. Food Mfg.	+-	++	++	++	++	++	++	++	++	++	++	++	++	++	13	-	1	-
11.	Misc. Machinery & Equip.	++	+-	--	--	-+	-+	-+	-+	-+	-+	++	--	--	-+	2	7	1	4
12.	Metal Stamping, Pressing	-+	++	++	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	2	12	-	-
13.	Printing & Publishing	++	++	++	++	++	++	++	++	++	++	++	++	++	++	14	-	-	-
14.	Bakeries	--	--	--	--	--	--	--	--	--	--	--	-+	++	+-	1	1	1	11
15.	Distilleries	+-	++	++	++	++	++	+-	++	++	++	++	++	++	++	12	-	2	-
16.	Aircraft & Parts Mfg.	--	--	--	--	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	-	-	10	4
17.	Fruit & Vegetable Canning	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-	14	-	-
18.	Butter, Cheese, Pasteurizing	--	+-	+-	--	--	--	--	--	--	-+	++	++	++	++	4	1	2	7
19.	Veneer & Plywood	++	-+	--	+-	++	+-	+-	++	++	+-	+-	+-	+-	++	5	1	7	1
20.	Men's Clothing Factories	++	+-	+-	+-	+-	+-	+-	+-	--	--	+-	--	--	--	1	-	8	5
21.	Women's Clothing Factories	+-	+-	+-	+-	+-	+-	+-	+-	--	--	--	-+	--	--	-	1	8	5
22.	Breweries	++	++	++	+-	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	3	10	1	-
23.	Electrical Apparatus & Supplies	++	++	++	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	3	-	11	-
24.	Synthetic Textile Mills	++	++	++	++	++	++	-+	-+	++	-+	-+	++	-+	-+	8	6	-	-
25.	Cotton Yarn & Cloth	+-	++	++	++	+-	+-	--	--	--	--	--	--	--	--	3	1	2	8
26.	Sash & Door Planing (Excl. Hardwood Flooring)	++	++	++	++	++	+-	+-	++	++	++	++	++	++	+-	11	-	3	-
27.	Printing & Bookbinding	-+	++	++	++	-+	-+	-+	++	++	-+	++	++	++	++	9	5	-	-
28.	Tobacco Products	++	++	++	++	++	-+	-+	-+	-+	-+	-+	++	++	++	8	6	-	-
29.	Wire & Wire Products	++	++	++	++	++	++	+-	++	++	++	++	++	++	++	13	-	1	-
30.	Flour & Feed Mills	+-	--	--	--	-+	-+	--	--	--	--	--	--	--	-+	-	3	1	10
31.	Misc. Metal Fabricating	-+	++	-+	-+	++	++	++	++	++	++	++	++	++	++	11	3	-	-
32.	Mfg. of Pharmaceuticals	++	++	++	++	-+	-+	-+	-+	-+	-+	-+	-+	++	++	6	8	-	-
33.	Fabricated Structural Metal	+-	++	+-	++	++	++	++	++	++	++	++	++	++	++	12	-	2	-
34.	Soft Drink Mfg.	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	++	++	2	-	12	-
35.	Furniture Mfg.	++	+-	+-	+-	+-	+-	++	+-	++	++	++	++	++	++	8	-	6	-
36.	Other Paper Converters	-+	-+	++	++	++	++	++	++	++	-+	++	++	++	++	11	3	-	-
37.	Railroad Rolling Stock	--	-+	--	--	--	--	--	--	--	--	--	--	--	--	-	1	-	13
38.	Rubber Industry	++	-+	--	-+	-+	-+	-+	--	--	--	--	--	--	--	1	5	-	8
39.	Shoe Factories & Repair	+-	--	--	--	--	--	--	--	--	--	--	--	--	--	-	-	1	13
40.	Shipbuilding and Repairs	++	+-	--	--	+-	+-	+-	+-	+-	+-	+-	+-	+-	+-	1	-	11	2
	${}^{+}W^{+}E_s$	19	20	19	18	15	12	9	13	16	11	16	17	19	17	221			
	${}^{-}E_s$	7	7	4	6	11	14	12	11	9	14	8	9	7	10		129		
	${}^{-}W^{+}E_s$	9	9	8	8	10	9	11	9	6	6	7	6	5	6			109	
	${}^{-}E_s$	5	4	9	8	4	5	8	7	9	9	9	8	9	7				101

* First sign refers to change in employment share
Second sign refers to change in wage earnings

TABLE 11

COMPARISON OF DIRECTIONAL* CHANGES IN THE RANKS OF EMPLOYMENT SHARES AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS IN EACH OF FORTY LEADING MANUFACTURING INDUSTRIES WITH REFERENCE TO THE RANKS IN 1946 ONTARIO, 1946-1960

Industry No.	Industry	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	+W		-W	
																++	-+	+-	--
1.	Pulp & Paper Mills................	++	-+	++	-+	++	+-	--	+-	++	+-	+-	+-	+-	+-	4	2	7	1
2.	Smelting & Refining	++	++	++	++	+-	++	++	++	++	++	++	+-	+-	+-	10	-	4	-
3.	Petroleum Refining	+-	+-	+-	--	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-	10	3	1
4.	Slaughtering & Meat Packing	-+	-+	--	+-	--	--	--	+-	+-	++	+-	+-	++	+-	2	2	6	4
5.	Motor Vehicle Mfg.	++	-+	-+	-+	-+	-+	-+	--	+-	-+	--	-+	-+	-+	1	10	1	2
6.	Iron & Steel Mills................	+-	++	++	+-	+-	+-	+-	+-	++	++	++	++	++	++	8	-	6	-
7.	Sawmills (incl. Shingles)	++	++	++	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	-+	3	11	-	-
8.	Mfg. of Industrial Chemicals.......	-+	-+	-+	--	-+	-+	--	--	--	+-	++	++	++	++	4	5	1	4
9.	Wire & Wire Products.............	++	+-	++	++	++	++	+-	++	++	++	+-	+-	+-	+-	8	-	6	-
10.	Misc. Food Mfg.	++	++	++	++	++	++	++	++	++	++	++	++	++	++	14	-	-	-
11.	Misc. Mach. and Equipment	+-	--	--	--	--	--	--	--	+-	++	++	+-	+-	--	2	-	4	8
12.	Metal Stamping and Pressing	-+	+-	-+	-+	++	++	++	-+	-+	++	-+	-+	++	++	6	7	1	-
13.	Printing & Publishing	+-	+-	+-	++	+-	+-	++	++	++	++	++	++	++	++	9	-	5	-
14.	Bakeries	-+	--	+-	--	--	--	--	+-	+-	--	-+	--	++	++	2	2	3	7
15.	Distilleries	++	+-	++	++	++	+-	+-	++	++	+-	++	++	++	++	10	-	4	-
16.	Aircraft & Parts	++	+-	++	++	++	++	++	++	++	++	++	++	+-	+-	11	-	3	-
17.	Fruit & Vegetable Canning	+-	--	--	--	--	--	--	--	--	--	--	--	--	-+	-	1	1	12
18.	Butter, Cheese, etc.	--	--	--	--	-+	--	--	--	--	--	++	+-	+-	+-	1	1	3	9
19.	Cotton Yarn & Cloth	+-	++	++	++	++	+-	+-	+-	--	-+	--	--	--	--	4	1	4	5
20.	Men's Clothing	++	+-	+-	+-	--	--	--	--	--	--	--	--	--	--	1	-	3	10
21.	Women's Clothing................	--	--	+-	+-	--	--	--	--	--	--	--	--	--	--	-	-	2	12
22.	Breweries	+-	+-	+-	--	--	++	++	++	++	++	++	-+	+-	-+	6	2	4	2
23.	Electrical Apparatus	++	++	++	++	++	++	++	++	++	++	++	++	++	++	14	-	-	-
24.	Synthetic Textile Mills	++	++	-+	-+	++	-+	-+	-+	-+	-+	++	++	+-	+-	5	7	2	-
25.	Motor Vehicle Suppl.	++	++	++	++	++	++	++	++	++	++	++	++	++	-+	13	1	-	-
26.	Sash & Door Planing (Excl. Hardwood Flooring).........	++	++	++	++	-+	--	++	++	++	++	-+	-+	-+	-+	8	5	-	1
27.	Printing and Bookbinding	+-	++	++	++	++	++	++	++	++	++	++	++	++	++	13	-	1	-
28.	Tobacco Products................	++	++	++	++	++	++	++	++	++	++	++	++	++	++	14	-	-	-
29.	Agricultural Implements...........	+-	++	++	++	-+	-+	-+	--	-+	-+	--	-+	-+	-+	3	8	1	2
30.	Flour and Feed Mills.............	++	-+	-+	-+	-+	--	-+	--	--	--	--	--	-+	-+	1	7	-	6
31.	Paper Boxes and Bags............	++	++	++	++	++	-+	++	++	++	++	++	++	++	++	13	1	-	-
32.	Mfg. of Pharmaceuticals	-+	--	--	--	-+	--	-+	-+	-+	-+	--	-+	-+	-+	-	9	-	5
33.	Fabricated Structural Steel	+-	+-	+-	++	++	+-	++	-+	++	++	++	++	++	++	9	1	4	-
34.	Soft Drinks Mfg.	+-	+-	--	--	--	--	-+	--	+-	+-	--	-+	-+	-+	-	4	4	6
35.	Furniture Mfg.	++	+-	+-	++	++	++	++	++	++	++	++	++	++	++	12	-	2	-
36.	Other Paper Converters	++	+-	+-	++	++	+-	+-	+-	+-	+-	+-	+-	+-	++	4	-	10	-
37.	Railroad Rolling Stock............	--	+-	--	--	--	--	--	--	--	--	--	--	--	--	-	-	1	13
38.	Rubber	++	-+	-+	--	--	--	-+	--	-+	-+	-+	--	--	--	1	6	-	7
39.	Shoe Factories, etc.	-+	--	+-	--	--	-+	--	--	--	--	--	--	--	--	-	2	1	11
40.	Shipbuilding and repairs	--	-+	--	--	+-	+-	+-	--	--	--	--	--	--	--	-	-	4	10
	$^{+}W^{+}E_{s}$	19	13	16	17	16	11	14	14	17	18	18	14	15	14	216			
	$^{+}W^{-}E_{s}$	6	6	6	6	9	8	9	6	7	8	6	9	8	11		105		
	$^{-}W^{-}E_{s}$	11	14	10	4	4	8	6	6	6	5	4	7	9	7			101	
	$^{-}W^{-}E_{s}$	4	7	8	13	11	13	11	14	10	9	12	10	8	8				138

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* First sign refers to change in employment share.
Second sign refers to change in wage-earnings.

Table 11 shows that the expanding labour intensive industries ($W^+E_S^+$) are: tobacco products, electrical apparatus and supplies, miscellaneous food manufacturing, paper boxes and bags, furniture manufacturing, printing and bookbinding, motor vehicle supplies, distilleries, smelting and refining, printing and publishing, fabricated structural steel, sash and door planing, wire and wire products, and iron and steel mills.

In the expanding capital intensive group ($W^+E_S^-$) are to be found such industries as petroleum refining, motor vehicles manufacturing, saw mills, manufacture of pharmaceuticals, agricultural implements, synthetic textiles, metal stamping and pressing, and to a lesser extent rubber products.

Industries whose skill requirements are apparently very low ($W^-E_S^+$) are other paper converters, pulp and paper mills, and slaughtering and meat packing. The contracting industries ($W^-E_S^-$) include railroad rolling stock, shoe factories, shipbuilding, women's clothing factories, men's clothing factories, fruit and vegetable canning, and butter and cheese.

These groupings are more readily identifiable in the findings for Ontario than they are for Canada. The differences arise, we imagine, from aggregation.

Although a few of the industries in each group are borderline cases in that they could fall in one of two categories, in the majority of cases the classification seems intuitively plausible.

Summing up it should be reiterated that the findings of the test reveal the following:

1) Although absolute wages have been increasing in all industries throughout the period, wages in some industries have been declining relatively.

2) Wages appear to allocate labour among manufacturing industries, but their allocative efficiency varies somewhat throughout the various phases of the business cycle.

3) Employment opportunities play a significant role in the direction of manpower flows at all times, but its influence is particularly marked in the downswing of the cycle. This fact, it should be noted, is not taken into account by the conventional theory.

4) There may be a direct relation between the critical level of unemployment of the Phillips curve and the percentage of the labour force that is technologically displaced.

5) The test also led to the development of a crude method of measuring the relative tightness of the labour market which may have some significance for studies in economic stabilization.

6) Fluctuations in the number of industries falling within the category $W^{-}E_{S}^{+}$ may be used as a leading indicator of the turning points of the business cycle.

7) Lastly, in the absence of adequate data or studies on the production functions of industries, the typology $W^{\pm}E_{S}^{\pm}$ may serve as a first approximation of the broad structural characteristics of industries.

PART III

FURTHER TESTS FOR INTERDEPENDENCE

EXTENSION OF PRINCIPAL TEST

In spite of the importance of the findings of the last test there remains a need to extend the analysis so as to examine more closely the degree of interdependence of the system as posited by the theory. It could be argued that a comparison of changes in the ranked order of wage-earnings and employment shares within industries through time does in fact constitute a crude method of examining a system of interdependent relationships. However, the technique employed in the last test could not, for instance, permit us to compare observed shifts in the relative position of wages in industry A with shifts in the relative position of A's and every other industry's employment shares, simultaneously. But these comparisons must be made before we can confidently state that the theory has been exposed to a critical test. The failure of many economists to capture this important fact of interdependence renders their empirical findings, in studies of wages and labour mobility, highly questionable. Consequently, what is needed is an extension of the last test - an extension which will facilitate one in making the kind of direct comparisons which the theory enunciates.

The technique which will be used here is an extension of the principle test - the sign test. In developing this technique, we will, as was done previously, commence by assuming an economy in which there are but three industries, I_1, I_2, and I_3. Likewise, it will be assumed that labour is homogeneous; that fringe

benefits and non-wage terms of employment are fixed in the sense that they cannot be used as off-sets to inter-industry money wage differentials; that there is full employment; and that there are no obstacles to the mobility of production workers among industries. Finally, it will be assumed that the system is in stable equilibrium, there being no desire on the part of any industry to increase or decrease its share of the available labour supply, nor is there any tendency for workers to move from one industry to another.

Given this set of conditions if there is an exogeneous disturbance which induces I_1 to raise the wages of its employees to increase its share of the labour supply what then is likely to be the repercussive effect of I_1's action on employment and wages in industries I_2 and I_3? According to the traditional theory, if I_2 and I_3 wish to retain a constant share of the labour supply, then both these industries will raise the money wages of their employees by amounts sufficient to offset the increase in I_1's wages. Conversely, if the industries I_2 and I_3 wish to reduce their respective share of the labour supply, then they are likely to allow the increase in money wages of their employees to remain well below that of I_1. The implications here are that wage movements in one industry will not only influence that industry's share of total employment but will also affect the employment and wage trends in all other industries which compete for similar labour in the same labour market area. Consequently, it is necessary when attempting to evaluate the correspondence between inter-industry wage - differentials to do so explicitly in terms of an interdependent system of relationships. What follows

may be regarded not only as a more direct method of capturing interdependence but also a way of identifying broad categories of groups of industries.

In this model we will attempt to deal with interdependence by analyzing the directional changes of relative wage-earnings and relative employment shares among industries throughout the period. More specifically, we will endeavour to show, in tabular form, the nature and pattern of the correspondence between the signs of the directional changes in the values (using 1946 as a base year) of the yearly ranks of the wages of production workers in each industry and the signs of the corresponding directional changes in the ranks of employment shares of that industry and all other industries. From such a table we should be able to observe the extent to which the directional changes of the ranks of wage-earnings and the ranks of employment shares of a single industry are in agreement or disagreement in terms of signs. In addition, we may also be able to discern any apparent pattern of correspondence between the directional changes of the ranks of any industry's wages and the concomittant directional changes in the ranks of employment shares of all other industries between identical time periods. This in essence provides a method of evaluating and grouping industries in accordance with the apparent interdependence of their wages and employment trends. The test can be expressed algebraically as follows:

1.

$$\text{Let} \quad \Delta \genfrac{}{}{0pt}{}{E_{it}}{E_{ito}} = \begin{cases} +\mathrm{I} & \text{if } E_{it} > E_{ito} \\ \mathrm{O} & \text{if } E_{it} = E_{ito} \\ -\mathrm{I} & \text{if } E_{it} < E_{ito} \end{cases}$$

$$\text{and} \quad \underset{w_{ito}}{\overset{w_{it}}{\triangle}} = \begin{cases} +I & \text{if } w_{it} > w_{ito} \\ O & \text{if } w_{it} = w_{ito} \\ -I & \text{if } w_{it} < w_{ito} \end{cases}$$

where $(i = 1, 2, 3, \ldots, K)$; $(t = 1, 2, 3, \ldots, n)$ such that each value represents the directional change in the rank of the wages (w) and the rank of the employment shares (E) between 1946 (to) and each time period in all industries.

2.

$$\text{Let } a_{ij}(T) \quad = +I \text{ if } \underset{E_{ito}}{\overset{E_{it}}{\triangle}} = \underset{w_{ito}}{\overset{w_{it}}{\triangle}}$$

$$= -I \text{ if } \underset{E_{ito}}{\overset{E_{it}}{\triangle}} \neq \underset{w_{ito}}{\overset{w_{it}}{\triangle}}$$

where $(i, j = 1, 2, 3, \ldots, K)$ and $T = t - to = t$ where $(t = 1, 2, 3, \ldots n)$ such that the values of $a_{ij}(T)$ represent either an agreement or disagreement in the directional change values of employment share ranks and wage ranks in all industries between 1946 and each successive time period.

3. Let $Q^{+}_{ij} = \dfrac{n + A_{ij}}{2}$ and $Q^{-}_{ij} = \dfrac{n - A_{ij}}{2}$

$$\text{where } A_{ij} = \sum_{T = I}^{n} a_{ij}(T) \qquad \text{(See Table 12)}$$

4.

$$\text{Let} \quad x_{ij} = \begin{cases} I & \text{if } Q^{+}_{ij} > Q^{-}_{ij} + 2 \\ O & \text{if } Q^{+}_{ij} < Q^{-}_{ij} - 2 \end{cases} \qquad \text{(See Table 13)}$$

(Note: A difference greater than ±2 is considered significant.)

TABLE 12

NUMBER OF AGREEMENTS (A) AND DIFFERENTIALS (D) OF THE SIGNS OF DIRECTIONAL CHANGES OF EMPLOYMENT SHARES AND WAGE EARNINGS WITHIN AND AMONG 40 LEADING MANUFACTURING INDUSTRIES· ONTARIO 1946-1960

E \ W		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	A	5	7	11	5	8	9	11	10	9	11	5	12	8	7	11	10	4	5	4	4	3	9	11	9	11	10	10	11	8	5	11	10	9	5	11	5	3	6	5	3
	D	9	7	3	9	6	5	3	4	5	3	9	2	6	7	3	4	10	9	10	10	11	5	3	5	3	4	4	3	6	9	3	4	5	9	3	9	11	8	9	11
2	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
3	A	11	7	1	11	6	7	3	8	7	3	9	2	2	9	5	4	10	9	10	12	11	3	3	5	3	4	2	3	4	9	3	4	1	7	1	9	11	10	11	11
	D	3	7	13	3	8	7	11	6	7	11	5	12	12	5	9	10	4	5	4	2	3	11	11	9	11	10	12	11	10	5	11	10	13	7	13	5	3	4	3	3
4	A	4	6	10	6	5	10	8	5	6	8	8	9	13	8	10	7	7	6	5	5	6	10	8	6	8	9	9	8	7	4	8	9	12	8	10	6	6	5	4	6
	D	10	8	4	8	9	4	6	9	8	6	6	5	1	6	4	7	7	8	9	9	8	4	6	8	6	5	5	6	7	10	6	5	2	6	4	8	8	9	10	8
5	A	10	6	4	10	3	6	2	5	8	2	10	3	5	10	6	5	11	10	7	13	12	6	2	4	2	3	1	2	3	6	2	7	4	8	4	10	12	9	12	12
	D	4	8	10	4	11	8	12	9	6	12	4	11	9	4	8	9	3	4	7	1	2	8	12	10	12	11	13	12	11	8	12	7	10	6	10	4	2	5	2	2
6	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
7	A	11	7	1	11	6	7	3	8	7	3	9	2	2	9	5	4	10	9	10	12	11	3	3	5	3	4	2	3	4	9	3	4	1	7	1	9	11	10	11	11
	D	3	7	13	3	8	7	11	6	7	11	5	12	12	5	9	10	4	5	4	2	3	11	11	9	11	10	12	11	10	5	11	10	13	7	13	5	3	4	3	3
8	A	3	3	9	9	6	11	5	8	3	5	11	6	10	11	7	4	10	9	6	8	9	9	5	3	5	6	6	5	6	5	5	8	9	11	7	7	9	6	7	9
	D	11	11	5	5	8	3	9	6	11	9	3	8	4	3	7	10	4	5	8	6	5	5	9	11	9	8	8	9	8	9	9	6	5	3	7	7	5	8	7	5
9	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
10	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
11	A	6	6	8	10	5	10	6	7	6	6	10	7	9	10	8	7	7	8	5	9	8	8	6	6	6	7	5	6	5	4	6	9	8	8	8	6	8	9	8	8
	D	8	8	6	4	9	4	8	7	8	8	4	7	5	4	6	7	7	6	9	5	6	6	8	8	8	7	9	8	9	10	8	5	6	6	6	8	6	5	6	6
12	A	5	5	9	9	10	7	7	8	5	7	7	6	6	7	3	4	8	7	8	6	7	7	7	5	7	6	8	7	10	9	7	8	7	9	7	7	7	6	7	7
	D	9	9	5	5	4	7	7	6	9	7	7	8	8	7	11	10	6	7	6	8	7	7	7	9	7	8	6	7	4	5	7	6	7	5	7	7	7	8	7	7
13	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
14	A	7	5	7	7	4	9	5	6	7	5	7	6	8	9	9	4	10	7	6	8	9	7	5	3	5	6	6	5	6	7	5	8	7	9	5	7	9	6	7	9
	D	7	9	7	7	10	5	9	8	7	9	7	8	7	5	5	10	4	7	8	6	5	7	9	11	9	8	8	9	8	7	9	6	7	5	9	7	5	8	7	5
15	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	9	5	4	10	2	10	14	7	12	14
16	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
17	A	9	5	3	11	4	5	1	6	7	1	11	2	4	11	5	4	12	11	8	14	13	5	1	3	1	2	0	1	2	7	1	6	3	9	3	11	13	8	13	13
	D	5	9	11	3	10	9	13	8	7	13	3	12	10	3	9	10	2	3	6	0	1	9	13	11	13	12	14	13	12	7	13	8	11	5	11	3	1	6	1	1
18	A	4	2	8	8	5	10	4	9	2	4	10	5	9	12	8	3	11	10	5	9	10	8	4	2	4	5	5	4	5	6	4	7	8	12	6	8	10	5	8	10
	D	10	12	6	6	9	4	10	5	12	10	4	9	5	2	6	11	3	4	9	5	4	6	10	12	10	9	9	10	9	8	10	7	6	2	8	6	4	9	6	4
19	A	10	10	4	6	9	2	8	7	10	8	4	7	3	4	6	9	5	6	9	7	6	4	8	10	8	7	7	8	7	10	8	5	4	4	6	8	6	7	8	6
	D	4	4	10	8	5	12	6	7	4	6	10	7	11	10	8	5	9	8	5	7	8	10	6	5	6	7	7	6	7	4	6	9	10	10	8	6	8	7	6	8
20	A	12	8	0	10	7	6	4	7	8	4	8	3	3	8	6	5	9	8	11	11	10	2	4	6	4	5	3	4	5	10	4	3	2	6	2	10	10	9	10	10
	D	2	6	14	4	7	8	10	7	6	10	6	11	11	6	8	9	5	6	3	3	4	12	10	8	10	9	11	10	9	4	10	11	12	8	12	4	4	5	4	4
21	A	10	6	2	8	5	6	2	5	8	2	10	3	5	8	6	5	11	10	11	11	12	4	2	4	2	3	3	2	5	8	2	3	4	8	2	10	12	7	10	12
	D	4	8	12	6	9	8	12	9	6	12	4	11	9	6	8	9	3	4	3	3	2	10	12	10	12	11	11	12	9	6	12	11	10	6	12	4	2	7	4	2
22	A	6	12	8	8	7	8	10	7	8	10	6	9	7	6	6	9	3	4	5	5	4	8	10	10	10	9	9	10	7	6	10	7	6	4	8	2	4	11	6	4
	D	8	2	6	6	7	6	4	7	6	4	8	5	7	8	8	5	11	10	9	9	10	6	4	4	4	5	5	4	7	8	4	7	8	10	6	12	10	3	8	10
23	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
24	A	7	3	7	9	8	9	7	12	3	7	7	6	6	11	9	4	8	9	6	8	7	5	7	5	7	8	6	7	6	9	7	8	7	9	7	9	7	6	7	7
	D	7	11	7	5	6	5	7	2	11	7	7	8	8	3	5	10	6	5	8	6	7	9	7	9	7	6	8	7	8	5	7	6	7	5	7	5	7	8	7	7
25	A	7	11	9	5	10	7	13	8	9	13	3	12	8	3	9	12	0	3	6	2	1	7	13	13	13	12	12	13	10	7	13	8	9	3	11	3	1	8	3	1
	D	7	3	5	9	4	7	1	6	5	1	11	2	6	11	5	2	14	11	8	12	13	7	1	1	1	2	2	1	4	7	1	6	5	11	3	11	13	6	11	13
26	A	10	12	4	8	7	6	8	3	10	8	6	7	7	4	6	9	5	4	9	7	6	6	8	10	8	9	7	8	7	8	8	7	6	4	6	6	6	11	6	6
	D	4	2	10	6	7	8	6	11	4	6	8	7	7	10	8	5	9	10	5	7	8	8	6	4	6	5	7	6	7	6	6	7	8	10	8	8	8	3	8	8
27	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
28	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
29	A	12	8	0	10	7	6	4	7	8	4	8	3	3	8	6	5	9	8	11	11	10	2	4	6	4	5	3	4	5	10	4	3	2	6	2	10	10	9	10	10
	D	2	6	14	4	7	8	10	7	6	10	6	11	11	6	8	9	5	6	3	3	4	12	10	8	10	9	11	10	9	4	10	11	12	8	12	4	4	5	4	4
30	A	9	5	3	11	4	5	1	6	7	1	11	2	4	11	5	4	12	11	8	14	13	5	1	3	1	2	0	1	2	7	1	6	3	9	3	11	13	8	13	13
	D	5	9	11	3	10	9	13	8	7	13	3	12	10	3	9	10	2	3	6	0	1	9	13	11	13	12	14	13	12	7	13	8	11	5	11	3	1	6	1	1
31	A	7	9	9	5	10	9	13	8	7	13	3	12	10	5	11	10	2	3	6	2	1	7	13	11	13	14	12	13	10	9	13	10	11	5	11	5	1	8	1	1
	D	7	5	5	9	4	5	1	6	7	1	11	2	4	9	3	4	12	11	8	12	13	7	1	3	1	0	2	1	4	5	1	4	3	9	3	9	13	6	13	13
32	A	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
	D	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
33	A	7	9	9	5	12	9	13	10	7	13	3	12	8	5	9	10	2	3	6	2	1	7	13	11	13	12	12	13	12	9	13	8	9	5	11	5	1	8	3	1
	D	7	5	5	9	2	5	1	4	7	1	11	2	6	9	5	4	12	11	8	12	13	7	1	3	1	2	2	1	3	5	1	6	5	9	3	9	13	6	11	13
34	A	10	8	4	12	5	8	4	5	8	4	10	3	5	8	4	5	9	8	9	11	10	6	4	6	4	5	3	4	5	6	4	7	4	6	4	8	10	11	10	10
	D	4	6	10	2	9	6	10	9	6	10	4	11	9	6	10	9	5	6	5	3	4	8	10	8	10	9	11	10	9	8	10	7	10	8	10	6	4	3	4	4
35	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
36	A	6	10	10	4	11	8	14	9	8	14	2	13	9	4	10	11	1	2	5	1	0	8	14	12	14	13	13	14	11	8	14	9	10	4	12	4	0	7	2	0
	D	8	4	4	10	3	6	0	5	6	0	12	1	5	10	4	3	13	12	9	13	14	6	0	2	0	1	1	0	3	6	0	5	4	10	2	10	14	7	12	14
37	A	9	5	3	11	4	7	1	6	5	1	11	0	4	9	3	2	12	11	10	12	13	5	1	3	1	2	2	1	4	7	1	4	3	9	1	9	13	8	11	13
	D	5	9	11	3	10	7	13	8	9	13	3	14	10	5	11	12	2	3	4	2	1	9	13	11	13	12	12	13	10	7	13	10	11	5	13	5	1	6	3	1
38	A	9	5	3	11	4	5	1	6	7	1	11	2	4	11	5	4	12	11	8	14	13	5	1	3	1	2	0	1	2	7	1	6	3	9	3	11	13	8	13	13
	D	5	9	11	3	10	9	13	8	7	13	3	12	10	3	9	10	2	3	6	0	1	9	13	11	13	12	14	13	12	7	13	8	11	5	11	3	1	6	1	1
39	A	9	5	3	9	4	7	1	6	7	1	11	2	4	9	5	4	12	11	10	12	13	5	1	3	1	2	2	1	4	7	1	4	3	9	1	9	13	8	11	13
	D	5	9	11	5	10	7	13	8	7	13	3	12	10	5	9	10	2	3	4	2	1	9	13	11	13	12	12	13	10	7	13	10	11	5	13	5	1	6	3	1
40	A	8	6	6	8	7	4	4	7	6	4	8	3	3	6	2	5	9	10	9	9	10	6	4	6	4	3	5	4	7	8	4	5	4	8	4	8	10	7	10	10
	D	6	8	8	6	7	10	10	7	8	10	6	11	11	8	12	9	5	4	5	5	4	8	10	8	10	11	9	10	7	6	10	9	10	6	10	6	4	7	4	4

TABLE 13

PATTERN OF SIGNIFICANT RELATIONSHIPS (INVERSE 0, DIRECT 1) OF THE SIGNS OF DIRECTIONAL CHANGES OF EMPLOYMENT SHARES AND WAGE EARNINGS WITHIN AND AMONG 40 LEADING MANUFACTURING INDUSTRIES OF ONTARIO, 1946-1960

									W^+																						W^-									
		2	10	13	15	16	23	25	27	28	31	33	35	3	5	7	29	32	8	12	24	26	6	9	22	1	38	30	4	11	19	36	14	17	18	20	21	34	37	39	40
	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1		1						0		0	0	0	0	0	0	0	0	0	0
E^+	27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							0	0	0	0	0	0	0	0	0	0	0	0	0
	28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							0	0	0	0	0	0	0	0	0	0	0	0	0
	31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1						1	0	0		0	0	0	0	0	0	0	0	0	0
	33	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1						1	0	0		0	0	0	0	0	0	0	0	0	0
	35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							0	0	0	0	0	0	0	0	0	0	0	0	0
	36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							0	0	0	0	0	0	0	0	0	0	0	0	0
	1		1	1	1	1	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1	1	1	0		0	0	0	0	0		0	0	0	0	0	0	0	0
	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22	1	1			1	1	1	1	1	1					1				1	1	1									0	0		0	0	0	0	0	0		0
	26	1				1								0					0		1	1		1		1	1				1		0	0	0			0			
	4				1				1			1	1	1	0			1	0	1		1	1		1	0	0	0			0					0				0	
	19	1		0		0						0		0	1			0			1		0	1	0	1		1		0	1		0	0				0			
	11			1					0						0		0	1					1				1	0	1	1	0		1			1					
	12	0			0	0								1	1		1				0			0		0		1	1									1			
	24	0			1	0													1		0		1	0	0			1	1			1	1		1			1			
	8	0	0	1		0	0	0		0	0	1		1		0					0		1	0	1	0		0	1	1				1	1		1	1	1		1
	3		0	0	0	0	0	0	0	0	0	0	0	0		0	0	0		0	0	0			0	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1
	5		0	0		0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0				1	1		1	1		1	1	1	1	1	1		1	1	1
	7		0	0	0	0	0	0	0	0	0	0	0	0		0	0	0		0	0	0			0	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1
	29		0	0		0	0	0	0	0	0	0	0	0		0	0	0		0		0			0	1	1	1	1		1	1		1		1	1		1	1	1
	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							1	1	1	1	1	1	1	1	1	1	1	1	1
E^-	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0		0	1			1	1		1	1	1	1	1	1		1	1	1
	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0		0	1			1	1		1	1	1	1	1	1	1	1	1	1
	14	0	0		1	0	0	0		0	0		0		0	0					0		1										1	1			1	1	1		1
	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0		0	1			1	1		1	1	1	1	1	1	1	1	1	1
	18	0	0	1		0	0	0	0	0	0				0	0	0		1	0	0	0	1	0		0	0			1			1	1	1	1	1	1	1		1
	20		0	0		0	0	0	0	0	0	0	0	0		0	0	0		0		0			0	1	1	1	1		1	1		1		1	1		1	1	1
	21		0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	1				1	1	1		1	1	1	1		1	1	1
	34		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0				1	1		1	1	1			1		1	1		1	1	1
	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0		0	0	1			1	1	1	1	1	1	1	1	1		1	1	1
	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0			0			1	1	1	1	1	1	1	1	1	1	1	1	1	1
	40		0	0	0	0	0	0	0	0	0	0	0		0	0		0		0		0	0								1			1	1	1	1		1	1	1

The findings of the sign test are shown in Table 12. As the table stands the evidence it presents on the degree of interdependence of industries, in terms of the directional changes of the ranks of both their employment shares and wage-earnings, is jumbled and confused. However, when these results are sorted out and organized, in accordance both with the dictates of the theory and the findings of the last test, meaningful patterns emerge. These patterns are depicted in Table 13.

In the first place, the findings of the test as portrayed in Table 13 identify four groups of industries ($W^+E_S^+$, $W^+E_S^-$, $W^-E_S^+$ and $W^-E_S^-$) which accord with those groups which emerged in the last test in Part II. Thus the results of the sign test corroborates the findings of the previous test. Secondly, and of equal importance, the test points to the possibility of grouping, for analytical purposes, an array of industries into two broad categories, namely the "closely inter-related" and "others". The significance of such a classification is not difficult to see, for if the wages and employment trends of certain industries appear to be closely inter-related while others are only remotely associated, then it would seem advantageous to confine further detailed analyses solely to the so-called closely inter-related industries. This will not be done in this study although it appears to provide an interesting area for further study.

Lastly, this test appears to confirm one of the more generalized postulates of the theory of resource allocation - namely that all industries are related through the factor market, in this particular case, the labour market. Although it is not

possible from the findings to state that labour flows from industry A to industry B when A's wages increase relatively to B's, the findings clearly indicate that there is movement between the groups $W^+E_s^+$ and $W^-E_s^-$. Thus the findings would seem to emphasize the importance of examining the system as a whole if one desires to evaluate the role of wages as an allocator of manpower among industries. In short the test has served to verify the contention we made earlier in Part I (p. 21) that analyses of the movements of wages and employment trends in a single industry are well-nigh meaningless in mobility studies of this kind.

This version of the sign test, it should be noted, provides an excellent device for observing the frequency distribution of agreements and disagreements of pairs of signs arising out of changes in the ranks of wages and employment shares, between successive time periods, within and among selected manufacturing industries. However, this technique is not without defects. Its principal defect is that it places too much emphasis on signs and does not take cognizance of the magnitude of quantitative changes. For instance, a 5 per cent positive or negative change in wages or employment share from one time period to another is given equal significance to a plus or minus 50 percentage change. If positive and negative relative changes between all time periods were of the same order of magnitude then our sign test could be given equal significance to simple correlation analysis. When this is not the case, the technique may prove far less efficient than might have been as first suspected. It now becomes important to capture both magnitudinal and directional changes in order to resolve the problem. This will be attempted in what follows.

Orthodox theory maintains that the effective labour supply to an industry at any point in time depends not only on the wages which are paid by that industry, but also on the wage-earnings of workers in every other industry in the system. The theory therefore posits an interdependent system of relationships which may be expressed as follows. Let $E_{si} = A_{ij}W_j$, where E_s is employment share, W is wage-earnings and $(i, j = 1, 2, 3, \ldots, n)$. Expanding, we get the following form:

$$\begin{aligned} e_{s1} &= f_1(w_1, w_2, w_3, \ldots w_n) \\ e_{s2} &= f_2(w_1, w_2, w_3, \ldots w_n) \\ &\;\;\vdots \\ e_{sn} &= f_n(w_1, w_2, w_3, \ldots w_n) \end{aligned}$$

Thus,

$$\begin{bmatrix} e_{s1} \\ e_{s2} \\ \cdot \\ \cdot \\ e_{sn} \end{bmatrix} \begin{matrix} = \\ = \\ \\ \\ = \end{matrix} \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2n} \\ \cdot & \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdot & \cdots & \cdot \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nn} \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ \cdot \\ \cdot \\ w_n \end{bmatrix}$$

These simultaneous equations provide a system whereby we can grapple with the problem of simultaneous interdependence while taking explicitly into account both magnitudinal and directional changes. From each of these simultaneous equations one can derive a set of simple correlation coefficients, which

TABLE 14

1. COEFFICIENTS OF CORRELATION OF EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS AMONG MANUFACTURING INDUSTRIES AND THEIR ANNUAL AVERAGE WEEKLY WAGE EARNINGS, METROPOLITAN AREA OF MONTREAL, 1948-1960*

Wage Earnings → / Employment Shares ↓	Meat Products	Bread and Other Bakery Products	Misc. Food Products	Distilled and Malt Liquors	Tobacco and Tobacco Products	Boots and Shoes (excluding rubber)	Textile Products (excluding clothing)	Clothing (textile and fur)	Paper Products (excluding pulp and paper mills)	Printing and Publishing	Iron and Steel Products	Transportation Equipment	Electrical Apparatus and Supplies	Chemical Products
Meat Products................	+0.49	+0.47	+0.48	+0.46	+0.41	+0.56	+0.49	+0.48	+0.47	+0.46	+0.41	+0.42	+0.34	+0.45
Bread and Other Bakery Products.....	+0.45	+0.47	+0.47	+0.47	+0.36	+0.39	+0.46	+0.35	+0.40	+0.42	+0.31	+0.39	+0.32	+0.45
Misc. Food Products..........	+0.43	+0.43	+0.44	+0.39	+0.33	+0.35	+0.47	+0.34	+0.44	+0.49	+0.36	+0.34	+0.36	+0.45
Distilled and Malt Liquors....	-0.28	-0.26	-0.30	-0.32	-0.36	-0.38	-0.25	-0.38	-0.27	-0.23	-0.34	-0.36	-0.32	-0.27
Tobacco and Tobacco Products..	-0.006	+0.013	-0.04	-0.04	-0.14	-0.08	-0.01	-0.16	-0.08	-0.03	-0.16	-0.12	-0.16	-0.04
Boots and Shoes (except rubber)....	-0.73	-0.75	-0.74	-0.76	-0.83	-0.65	-0.72	-0.76	-0.74	-0.75	-0.83	-0.79	-0.83	-0.76
Textile Products.............	-0.59	-0.62	-0.63	-0.64	-0.65	-0.63	-0.67	-0.71	-0.70	-0.66	-0.70	-0.70	-0.72	-0.66
Clothing (textile and fur)....	+0.03	+0.01	+0.04	-0.002	-0.09	-0.01	+0.06	-0.07	-0.01	+0.04	-0.10	-0.07	-0.10	+0.02
Paper Products (excluding pulp and paper mills)..	+0.62	+0.63	+0.63	+0.64	+0.54	+0.52	+0.63	+0.52	+0.57	+0.60	+0.50	+0.57	+0.54	+0.62
Printing and Publishing.......	+0.83	+0.84	+0.85	+0.84	+0.79	+0.71	+0.84	+0.76	+0.79	+0.83	+0.78	+0.79	+0.80	+0.84
Iron and Steel Products.......	-0.67	-0.67	-0.69	-0.68	-0.59	-0.55	-0.67	-0.57	-0.63	-0.65	-0.56	-0.62	-0.58	-0.69
Transportation Equipment......	-0.44	-0.45	-0.45	-0.43	-0.33	-0.40	-0.48	-0.36	-0.41	-0.46	-0.35	-0.36	-0.36	-0.43
Electrical Apparatus and Supplies........	+0.55	+0.59	+0.59	+0.56	+0.55	+0.66	+0.64	+0.67	+0.67	+0.65	+0.66	+0.63	+0.68	+0.58
Chemical Products............	-0.81	-0.77	-0.81	-0.81	-0.84	-0.84	-0.80	-0.88	-0.84	-0.81	-0.87	-0.86	-0.85	-0.80

* Employment shares relate to the percentage distribution among fourteen leading manufacturing industries of the total number of male production workers employed in all manufacturing in the Metropolitan area of Montreal.

TABLE 15

1. COEFFICIENTS OF CORRELATION OF EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS AMONG MANUFACTURING INDUSTRIES AND THEIR ANNUAL AVERAGE WEEKLY WAGE EARNINGS, ONTARIO, 1946-1960*

Employment Shares ↓ / Wage Earnings →	Pulp and Paper Mills	Smelting and Refining	Petroleum Refining	Slaughtering and Meat Packing	Motor Vehicles Manufacturing	Iron and Steel Mills	Sawmills (incl. Shingles)	Manufacture of Industrial Chemicals	Fish Products Industry	Miscellaneous Food Manufacturing	Miscellaneous Machinery and Equipment	Metal Stamping, Pressing	Printing and Publishing	Bakeries	Distilleries	Aircraft and Parts Manufacturing	Fruit and Vegetable Canning	Butter, Cheese, etc.	Cotton Yarn and Cloth	Men's Clothing Factories	Women's Clothing Factories	[illegible]	Electrical Apparatus and Supplies	Synthetic Textile Mills	[illegible]	Sash and Door Planing Mills	Printing and Book-Binding	[illegible]	Wire and Wire Products	Flour and Feed Mills	[illegible]	Manufacture of Pharmaceuticals	Fabricated Structural Metal	Soft Drink Manufacturing	Furniture Manufacturing	Other Paper Converters	Railroad Rolling Stock	Rubber Industry	Shoe Factories and Repairs	Shipbuilding and Repairs
Pulp and Paper Mills	+0.80	[illegible]	[illegible]	[illegible]	+0.31	+0.84	[illegible]	[illegible]	+0.76	+0.77	[illegible]	+0.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.74	[illegible]	[illegible]	[illegible]	+0.59	[illegible]	[illegible]	+0.33	+.33	[illegible]	+.78	+0.83	[illegible]	+.80	[illegible]	+.83	+0.80	0.84	+0.80	[illegible]	[illegible]
Smelting and Refining	.35	[illegible]	[illegible]	[illegible]	+0.70	+0.94	+0.21	[illegible]	[illegible]	[illegible]	[illegible]	+0.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.85	[illegible]	[illegible]	[illegible]	+0.71	[illegible]	[illegible]	+0.32	[illegible]	+0.92	+.79	[illegible]	[illegible]	+.84	[illegible]	+0.36	[illegible]	.78	+0.35	[illegible]	+0.34
Petroleum Refining	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.98	[illegible]	[illegible]	[illegible]	-0.65	[illegible]	[illegible]	-0.39	[illegible]	[illegible]	-0.93	[illegible]	[illegible]	.21	[illegible]	[illegible]	[illegible]	.30	[illegible]	[illegible]	[illegible]
Slaughtering and Meat Packing	+.61	[illegible]	[illegible]	+0.67	[illegible]	+0.71	+.57	+0.71	[illegible]	[illegible]	[illegible]	+0.64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.55	[illegible]	[illegible]	[illegible]	+0.33	[illegible]	[illegible]	+0.68	[illegible]	[illegible]	+.68	[illegible]	[illegible]	.52	[illegible]	+0.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Motor Vehicles Manufacturing	-0.10	[illegible]	[illegible]	[illegible]	-0.17	-0.16	-0.16	[illegible]	[illegible]	[illegible]	[illegible]	.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.02	[illegible]	[illegible]	[illegible]	+.13	[illegible]	[illegible]	-0.17	[illegible]	[illegible]	-.17	[illegible]	[illegible]	-.11	[illegible]	-0.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iron and Steel Mills	+.79	[illegible]	+.76	[illegible]	[illegible]	+0.83	[illegible]	[illegible]	[illegible]	[illegible]	+0.77	+0.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.31	+0.81	[illegible]	[illegible]	[illegible]	+0.49	[illegible]	[illegible]	+0.76	[illegible]	[illegible]	+.77	[illegible]	[illegible]	.77	+.71	+0.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sawmills (incl. [illegible]	-.91	[illegible]	[illegible]	[illegible]	[illegible]	-.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.86	[illegible]	[illegible]	[illegible]	-.69	[illegible]	[illegible]	-0.94	[illegible]	[illegible]	-.89	[illegible]	[illegible]	-.92	-0.94	-0.92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacture of Industrial [illegible]	+.67	[illegible]	[illegible]	[illegible]	[illegible]	+.75	[illegible]	[illegible]	[illegible]	[illegible]	+0.66	.76	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.61	[illegible]	[illegible]	[illegible]	+.32	[illegible]	[illegible]	+0.68	[illegible]	[illegible]	+0.67	[illegible]	[illegible]	+0.66	+.71	+0.70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wire and Wire Products	+.76	[illegible]	[illegible]	[illegible]	[illegible]	+.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.75	[illegible]	[illegible]	[illegible]	+0.45	[illegible]	+.77	+0.74	[illegible]	[illegible]	+0.79	[illegible]	[illegible]	+.74	.72	+.76	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous Food Manufacturing	+.76	[illegible]	[illegible]	[illegible]	[illegible]	+.74	[illegible]	[illegible]	+.79	[illegible]	[illegible]	+.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.77	[illegible]	[illegible]	[illegible]	+.63	[illegible]	[illegible]	+0.76	[illegible]	[illegible]	+.93	[illegible]	[illegible]	.74	.76	.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.23	[illegible]	[illegible]	[illegible]	+.08	[illegible]	[illegible]	+0.27	[illegible]	[illegible]	+.18	[illegible]	[illegible]	.27	+0.26	.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Metal Stamping, Pressing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.33	[illegible]	[illegible]	[illegible]	+0.35	[illegible]	[illegible]	+0.45	[illegible]	[illegible]	+0.42	[illegible]	[illegible]	.41	+0.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Printing and Publishing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.84	[illegible]	[illegible]	[illegible]	+0.73	[illegible]	[illegible]	+0.90	[illegible]	[illegible]	+.88	[illegible]	[illegible]	.57	+0.37	+.36	[illegible]	[illegible]	+0.35	[illegible]	[illegible]
Bakeries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.09	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.08	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	+0.08	[illegible]	[illegible]	+.08	[illegible]	[illegible]	.02	+0.16	+0.06	[illegible]	+.11	[illegible]	[illegible]	[illegible]
Distilleries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.38	[illegible]	[illegible]	[illegible]	+0.31	[illegible]	[illegible]	+0.54	[illegible]	[illegible]	+.43	[illegible]	[illegible]	.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aircraft and Parts Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.65	[illegible]	[illegible]	[illegible]	+0.88	[illegible]	[illegible]	.65	[illegible]	[illegible]	.56	[illegible]	[illegible]	+.67	[illegible]	+.55	[illegible]	[illegible]	+0.71	[illegible]	[illegible]
Fruit and Vegetable Canning	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.71	[illegible]	[illegible]	[illegible]	-.69	[illegible]	[illegible]	.59	[illegible]	[illegible]	.65	[illegible]	[illegible]	.60	.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Butter, Cheese, etc.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.50	[illegible]	[illegible]	[illegible]	+.30	[illegible]	[illegible]	+.62	[illegible]	[illegible]	.63	[illegible]	[illegible]	.60	.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cotton Yarn and Cloth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.61	[illegible]	[illegible]	[illegible]	.33	[illegible]	[illegible]	-0.71	[illegible]	[illegible]	-.66	[illegible]	[illegible]	-.70	-.73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Men's Clothing Factories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.93	-.77	[illegible]	-0.78	-0.73	-0.77	-0.91	-0.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.78	[illegible]	[illegible]	[illegible]	-.47	[illegible]	[illegible]	-.78	[illegible]	-.77	-.77	[illegible]	[illegible]	-.79	-.73	-.40	[illegible]	-0.71	[illegible]	[illegible]	[illegible]
Women's Clothing Factories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.94	-.77	[illegible]	[illegible]	[illegible]	[illegible]	-0.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.74	[illegible]	[illegible]	[illegible]	-0.70	[illegible]	[illegible]	-.92	[illegible]	[illegible]	-0.72	[illegible]	[illegible]	-.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.95	[illegible]	[illegible]	[illegible]	-.66	[illegible]	[illegible]	-.37	[illegible]	[illegible]	-0.92	[illegible]	[illegible]	.98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Electrical Apparatus and Supplies	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.66	[illegible]	[illegible]	[illegible]	+.71	[illegible]	[illegible]	+.53	[illegible]	[illegible]	+0.54	[illegible]	[illegible]	+0.56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Synthetic Textile Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.72	[illegible]	[illegible]	[illegible]	+0.50	[illegible]	[illegible]	+0.80	[illegible]	[illegible]	+.78	[illegible]	[illegible]	.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Supplies	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.28	[illegible]	[illegible]	[illegible]	-.11	[illegible]	[illegible]	-0.42	[illegible]	[illegible]	.34	[illegible]	[illegible]	-.37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Planing Mill	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.55	[illegible]	[illegible]	[illegible]	-0.27	[illegible]	[illegible]	.63	[illegible]	[illegible]	-.62	[illegible]	[illegible]	-.65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Printing and Book-binding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.73	[illegible]	[illegible]	[illegible]	+.66	[illegible]	[illegible]	.32	[illegible]	[illegible]	+.92	[illegible]	[illegible]	+.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tobacco Products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.11	[illegible]	[illegible]	[illegible]	-.19	[illegible]	[illegible]	+.26	[illegible]	[illegible]	+.27	[illegible]	[illegible]	.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agricultural Implements	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.84	[illegible]	[illegible]	[illegible]	-.87	[illegible]	[illegible]	-.84	[illegible]	[illegible]	.73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Flour and Feed Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.58	[illegible]	[illegible]	[illegible]	.75	[illegible]	[illegible]	-.51	[illegible]	[illegible]	-.52	[illegible]	[illegible]	-.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Paper Boxes and Bags	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.76	[illegible]	[illegible]	[illegible]	.49	[illegible]	[illegible]	+.94	[illegible]	[illegible]	+.94	[illegible]	[illegible]	+.83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacture of Pharmaceuticals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.09	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.29	[illegible]	[illegible]	[illegible]	-.52	[illegible]	[illegible]	-.17	[illegible]	[illegible]	-.14	[illegible]	[illegible]	-.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fabricated Structural Metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.35	[illegible]	[illegible]	[illegible]	.77	[illegible]	[illegible]	+.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Soft Drink Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.19	[illegible]	[illegible]	[illegible]	.14	[illegible]	[illegible]	.30	[illegible]	[illegible]	.21	[illegible]	[illegible]	-.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Furniture Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.66	[illegible]	[illegible]	[illegible]	+.60	[illegible]	[illegible]	.61	[illegible]	[illegible]	.60	[illegible]	[illegible]	+.61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other Paper Converters	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+.38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.86	[illegible]	[illegible]	[illegible]	+0.33	[illegible]	[illegible]	.88	[illegible]	[illegible]	+.88	[illegible]	[illegible]	+.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Railroad Rolling [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.76	[illegible]	[illegible]	[illegible]	-.46	[illegible]	[illegible]	.32	[illegible]	[illegible]	-.84	[illegible]	[illegible]	-0.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rubber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.77	[illegible]	[illegible]	[illegible]	-0.34	[illegible]	[illegible]	-.73	[illegible]	[illegible]	-.74	[illegible]	[illegible]	-.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shoe Factories and Repairs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.62	[illegible]	[illegible]	[illegible]	.74	[illegible]	[illegible]	-.58	[illegible]	[illegible]	.50	[illegible]	[illegible]	-.63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shipbuilding and Repairs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.43	[illegible]	[illegible]	[illegible]	-0.38	[illegible]	[illegible]	-.46	[illegible]	[illegible]	-.38	[illegible]	[illegible]	-0.49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Employment shares relate to the percentage distribution among forty leading Ontario Manufacturing Industries of the total number of male production workers employed in all manufacturing.

TABLE 16

1. COEFFICIENTS OF CORRELATION OF EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS AMONG MANUFACTURING INDUSTRIES AND THEIR ANNUAL AVERAGE WEEKLY WAGE EARNINGS, CANADA, 1946-1960*

Wage Earnings → Employment Shares ↓	Pulp and Paper Mills	Smelting and Refining	Petroleum Refining	Slaughtering and Meat Packing	Motor Vehicles Manufacturing	Iron and Steel Mills	Sawmills (incl. Shingles)	Manufacture of Industrial Chemicals	Fish Products Industry	Miscellaneous Food Manufacturing	Miscellaneous Machinery and Equipment	Metal Stamping, Pressing	Printing and Publishing	Bakeries	Distilleries	Aircraft and Parts Manufacturing	Fruit and Vegetable Canners	Butter, Cheese, etc	Veneer and Plywood	Men's Clothing Factories	Women's Clothing Factories	Breweries	Electrical Apparatus and Supplies	Synthetic Textile Mills	Cotton, Yarn and Cloth	Sash, Door and Planing Mills	Printing and Book-Binding	Tobacco Products	Wire and Wire Products	Flour and Feed Mills	Miscellaneous Metal Fabricating	Manufacture of Pharmaceuticals	Fabricated Structural Metal	Soft Drink Manufacturing	Furniture Manufacturing	Other Paper Converters	Railroad Rolling Stock	Rubber Industry	Shoe Factories and Repairs	Shipbuilding and Repairs
Pulp and Paper Mills	[illegible]	[illegible]	[illegible]	[illegible]	+0.90	+0.94	+0.93	+0.94	+0.95	+0.94	+0.92	+0.93	[illegible]	+0.94	[illegible]	+0.92	+0.93	+0.94	+0.93	+0.91	+0.92	[illegible]	+0.94	[illegible]	+0.91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.90	+0.93	[illegible]	[illegible]	+0.93	[illegible]	+0.92	[illegible]	+0.89	[illegible]
Smelting and Refining	[illegible]	[illegible]	[illegible]	[illegible]	+0.90	+0.94	+0.95	+0.93	+0.89	+0.94	+0.95	+0.94	[illegible]	+0.93	[illegible]	+0.93	+0.93	+0.93	+0.95	+0.94	+0.91	[illegible]	+0.94	[illegible]	+0.96	+0.94	[illegible]	[illegible]	+0.96	[illegible]	+0.95	+0.94	+0.94	[illegible]	+0.94	[illegible]	+0.93	[illegible]	+0.85	[illegible]
Petroleum Refining	[illegible]	[illegible]	[illegible]	[illegible]	+0.63	+0.71	+0.72	+0.71	+0.73	+0.72	+0.70	+0.72	[illegible]	+0.73	+0.70	+0.72	+0.72	+0.73	+0.69	+0.68	+0.70	[illegible]	+0.77	[illegible]	+0.67	[illegible]	[illegible]	+0.70	+0.70	+0.58	+0.69	+0.75	[illegible]	+0.67	+0.71	[illegible]	+0.72	+0.69	+0.70	+0.75
Slaughtering and Meat Packing	[illegible]	[illegible]	[illegible]	[illegible]	+0.27	[illegible]	+0.21	+0.26	[illegible]	+0.28	+0.23	+0.22	[illegible]	+0.28	[illegible]	+0.27	+0.27	[illegible]	[illegible]	+0.21	+0.33	[illegible]	+0.26	[illegible]	+0.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.17	+0.19	[illegible]	[illegible]	+0.25	[illegible]	+0.26	[illegible]	+0.47	[illegible]
Motor Vehicles Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	-0.43	[illegible]	[illegible]	-0.40	[illegible]	-0.41	-0.36	-0.38	[illegible]	-0.41	[illegible]	-0.37	[illegible]	-0.41	[illegible]	[illegible]	-0.45	[illegible]	-0.37	[illegible]	-0.32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.32	-0.37	[illegible]	[illegible]	-0.37	[illegible]	-0.41	[illegible]	-0.46	-0.44
Iron and Steel Mills	[illegible]	[illegible]	[illegible]	[illegible]	+0.63	[illegible]	[illegible]	[illegible]	+0.43	+0.57	+0.59	+0.56	[illegible]	+0.55	[illegible]	+0.52	[illegible]	+0.55	[illegible]	[illegible]	+0.60	[illegible]	+0.55	+0.57	+0.63	[illegible]	[illegible]	[illegible]	+0.61	[illegible]	+0.57	+0.52	[illegible]	+0.60	+0.58	+0.60	+0.57	[illegible]	+0.53	[illegible]
Sawmills (incl. Shingles)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.91	-0.88	-0.89	[illegible]	-0.91	[illegible]	-0.89	[illegible]	-0.91	[illegible]	[illegible]	-0.92	[illegible]	-0.90	[illegible]	-0.83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.85	-0.88	[illegible]	[illegible]	-0.89	[illegible]	-0.91	[illegible]	-0.94	[illegible]
Manufacture of Industrial Chemicals	+0.75	+0.75	+0.70	[illegible]	+0.80	[illegible]	[illegible]	[illegible]	[illegible]	+0.76	+0.74	+0.74	[illegible]	+0.75	[illegible]	+0.72	+0.77	+0.76	[illegible]	[illegible]	+0.77	[illegible]	+0.70	[illegible]	+0.75	[illegible]	+0.75	[illegible]	+0.75	[illegible]	+0.73	[illegible]	[illegible]	[illegible]	+0.75	+0.75	+0.75	[illegible]	+0.77	+0.74
Fish Products Industry	[illegible]	[illegible]	[illegible]	[illegible]	-0.04	[illegible]	[illegible]	+0.00	[illegible]	-0.02	+0.02	+0.02	[illegible]	-0.01	[illegible]	+0.03	[illegible]	+0.01	[illegible]	[illegible]	+0.01	[illegible]	-0.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.07	[illegible]	[illegible]	[illegible]	-0.01	[illegible]	[illegible]	+0.01	+0.03	[illegible]
Miscellaneous Food Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	+0.68	[illegible]	[illegible]	+0.66	[illegible]	+0.66	+0.62	+0.64	[illegible]	+0.65	[illegible]	+0.64	[illegible]	+0.66	[illegible]	[illegible]	[illegible]	[illegible]	+0.57	[illegible]	+0.63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.61	+0.61	[illegible]	[illegible]	+0.64	[illegible]	+0.63	[illegible]	[illegible]	+0.64
Miscellaneous Machinery and Equipment	[illegible]	[illegible]	[illegible]	[illegible]	-0.75	-0.66	[illegible]	-0.67	-0.57	-0.69	-0.65	-0.67	[illegible]	-0.70	[illegible]	-0.69	-0.67	-0.68	[illegible]	[illegible]	-0.70	[illegible]	-0.63	[illegible]	-0.69	-0.63	[illegible]	[illegible]	-0.76	[illegible]	-0.64	-0.62	[illegible]	[illegible]	-0.68	[illegible]	-0.65	[illegible]	-0.65	[illegible]
Metal Stamping, Pressing	[illegible]	[illegible]	[illegible]	[illegible]	+0.00	+0.11	[illegible]	+0.09	[illegible]	+0.10	+0.10	+0.08	[illegible]	+0.12	[illegible]	+0.14	[illegible]	+0.12	[illegible]	[illegible]	+0.09	[illegible]	+0.20	[illegible]	+0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.07	+0.12	[illegible]	[illegible]	+0.10	[illegible]	+0.10	[illegible]	+0.14	[illegible]
Printing and Publishing	[illegible]	[illegible]	[illegible]	[illegible]	+0.84	[illegible]	[illegible]	+0.86	[illegible]	+0.85	[illegible]	+0.87	[illegible]	+0.86	[illegible]	+0.85	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.74	[illegible]
Bakeries	[illegible]	[illegible]	[illegible]	[illegible]	+0.68	[illegible]	[illegible]	+0.66	[illegible]	+0.67	[illegible]	+0.63	[illegible]	+0.67	[illegible]	+0.64	[illegible]	+0.67	[illegible]	[illegible]	+0.67	[illegible]	+0.64	[illegible]	+0.61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.59	+0.60	[illegible]	[illegible]	+0.65	[illegible]	+0.64	[illegible]	+0.72	[illegible]
Distilleries	[illegible]	[illegible]	[illegible]	[illegible]	+0.22	[illegible]	[illegible]	+0.31	[illegible]	+0.32	+0.32	[illegible]	[illegible]	+0.35	[illegible]	+0.38	[illegible]	+0.36	[illegible]	[illegible]	+0.32	[illegible]	+0.37	[illegible]	+0.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.32	[illegible]	[illegible]	[illegible]	+0.32	[illegible]	+0.33	[illegible]	+0.43	+0.40
Aircraft and Parts Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	+0.67	[illegible]	[illegible]	+0.72	[illegible]	+0.73	+0.75	+0.75	[illegible]	+0.74	[illegible]	+0.77	[illegible]	+0.74	[illegible]	[illegible]	+0.72	[illegible]	[illegible]	+0.76	+0.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.78	+0.76	[illegible]	[illegible]	+0.73	[illegible]	+0.76	[illegible]	+0.74	+0.74
Fruit and Vegetable Canners	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.57	[illegible]	-0.57	-0.60	-0.61	[illegible]	-0.57	[illegible]	-0.60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.50	[illegible]	-0.64	[illegible]	[illegible]	[illegible]	-0.59	[illegible]	-0.58	[illegible]	[illegible]	-0.53
Butter, Cheese, etc.	[illegible]	[illegible]	[illegible]	[illegible]	+0.72	+0.71	[illegible]	[illegible]	[illegible]	+0.71	+0.66	+0.68	[illegible]	+0.71	[illegible]	+0.66	[illegible]	[illegible]	[illegible]	[illegible]	+0.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.71	[illegible]	[illegible]	[illegible]	+0.60	+0.56	[illegible]	[illegible]	+0.69	[illegible]	+0.69	[illegible]	+0.73	[illegible]
Veneer and Plywood	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.96	+0.96	[illegible]	+0.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.97
Men's Clothing Factories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.69	-0.67	[illegible]	-0.69	[illegible]	[illegible]	-0.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.63	[illegible]	[illegible]	[illegible]	-0.68	[illegible]	-0.67	[illegible]	-0.75	[illegible]
Women's Clothing Factories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.35	[illegible]	-0.36	[illegible]	[illegible]	-0.37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.50	[illegible]
Breweries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.90	-0.92	[illegible]	-0.90	-0.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.91	[illegible]	-0.82	-0.87
Electrical Apparatus and Supplies	[illegible]	[illegible]	[illegible]	+0.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.75	+0.78	+0.78	+0.75	+0.74	[illegible]	+0.74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.80	+0.78	[illegible]	[illegible]	+0.77	[illegible]	[illegible]	[illegible]	[illegible]	+0.69
Synthetic Textile Mills	[illegible]	[illegible]	[illegible]	-0.36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.39	-0.40	-0.39	-0.40	-0.41	[illegible]	-0.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.40	[illegible]	[illegible]	[illegible]	-0.39	[illegible]	-0.42	[illegible]	-0.48	-0.48
Cotton, Yarn and Cloth	[illegible]	[illegible]	[illegible]	-0.84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.85	-0.86	-0.87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.84	[illegible]	[illegible]	[illegible]	-0.86	[illegible]	-0.87	[illegible]	-0.92	-0.90
Sash and Door Planing Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.42	-0.39	-0.38	-0.41	-0.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.34	[illegible]	[illegible]	[illegible]	-0.40	[illegible]	[illegible]	[illegible]	-0.58	-0.46
Printing and Book-Binding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.64	+0.65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.61	[illegible]	[illegible]	+0.67
Tobacco Products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.48	[illegible]	[illegible]	-0.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wire and Wire Products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Flour and Feed Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous Metal Fabricating	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacture of Pharmaceuticals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fabricated Structural Metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.96
Soft Drink Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	-0.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.21
Furniture Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Paper Converters	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.42
Railroad Rolling Stock	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rubber Industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.78
Shoe Factories and Repairs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shipbuilding and Repairs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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*Employment shares relate to the percentage distribution among forty leading Canadian Manufacturing Industries of the total number of male production workers employed in all manufacturing.

may then be put in the form of a correlation matrix (see Tables 14, 15, and 16). Such a correlation matrix may be used in part as basic data for identifying and classifying industries into sets of closely inter-related groups of the kind generated by the sign test.

However, before examining those results, we will posit a variant of the hypothesis - a variant which some economists have advanced and striven to substantiate, for the most part, on a priori grounds. Briefly, this alternative hypothesis states that the annual changes in the employment shares of each industry are dependent upon the wage-earnings in that industry and all other industries. The form of this hypothesis is similar to the previous one and can be written as, $\triangle E_{si}(t_1 - t_o) = A_{ij}W_j(t_o)$ where $\triangle E_{si}$ represents the change in percentage points of employment shares between consecutive time periods, W represents wage-earnings and $(i, j = 1, 2, 3, \ldots, n)$.

The results of the test of the first hypothesis ($E_{si} = A_{ij}W_j$) are an amalgam of very highly significant positive and negative correlation coefficients along with a relatively weak set of inverse and direct associations. The results of the second hypothesis $\triangle E_{si}(t_1 - t_o) = A_{ij}W_j(t_o)$ are on average unacceptably low in terms of their statistical significance. (See Tables 17, 18, and 19.) Many a priori reasons could no doubt be advanced to account for the disparity between the results of the two hypotheses. It could for instance be argued that the disparity in the results may be traced to the inappropriateness of the time lag used. But even if the time lag were changed so as to ensure a more satisfactory set of correla-

TABLE 17

3. COEFFICIENTS OF CORRELATION OF ANNUAL CHANGES (Percentage Points) IN THE EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS OF EACH INDUSTRY AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS, METROPOLITAN AREA OF MONTREAL, 1948-1960*

Wage Earnings → / ↓ Changes in Employment Shares	Meat Products	Bread and Other Bakery Products	Misc. Food Products	Distilled and Malt Liquors	Tobacco and tobacco Products	Boots and Shoes	Textile Products	Clothing (textile and fur)	Paper Products	Printing and Publishing	Iron and Steel Products	Trans-portation Equipment	Electrical Apparatus, Etc.	Chemical Products
Meat Products.................	-0.02	+0.04	-0.05	-0.01	+0.04	-0.22	-0.08	-0.12	-0.06	-0.03	-0.01	-0.005	+0.04	+0.005
Bread and Other Bakery Products......	+0.58	+0.58	+0.48	+0.60	+0.55	+0.48	+0.54	+0.56	+0.54	+0.54	+0.57	+0.62	+0.55	+0.54
Misc. Food Products...........	-0.14	-0.12	-0.16	-0.11	-0.10	-0.10	-0.15	-0.06	-0.09	-0.15	-0.11	-0.03	-0.11	-0.13
Distilled and Malt Liquors....	-0.10	-0.10	-0.06	-0.07	-0.09	+0.09	-0.05	+0.07	+0.03	-0.07	-0.02	+0.03	-0.02	-0.06
Tobacco and Tobacco Products..	+0.20	+0.24	+0.25	+0.26	+0.19	+0.34	+0.30	+0.35	+0.35	+0.27	+0.26	+0.33	+0.28	+0.28
Boots and Shoes (except rubber).....	+0.21	+0.24	+0.16	+0.24	+0.29	+0.06	+0.13	+0.16	+0.16	+0.16	+0.21	+0.25	+0.21	+0.21
Textile Products (except clothing)...	-0.004	+0.05	-0.01	+0.03	-0.07	+0.01	+0.06	-0.01	+0.06	+0.02	-0.07	+0.04	-0.07	+0.04
Clothing (textile and fur)....	+0.09	+0.11	+0.02	+0.11	+0.10	-0.01	+0.02	+0.05	+0.07	+0.03	+0.06	+0.13	+0.07	+0.08
Paper Products (excluding pulp and paper mills).	+0.55	+0.55	+0.46	+0.56	+0.51	+0.48	+0.49	+0.53	+0.53	+0.49	+0.51	+0.58	+0.50	+0.52
Printing and Publishing.......	+0.35	+0.31	+0.26	+0.33	+0.25	+0.31	+0.30	+0.30	+0.34	+0.31	+0.26	+0.36	+0.23	+0.32
Iron and Steel Products.......	-0.31	-0.31	-0.22	-0.33	-0.31	-0.33	-0.26	-0.35	-0.26	-0.23	-0.30	-0.36	-0.23	-0.23
Transportation Equipment......	-0.15	-0.14	-0.12	-0.16	-0.13	-0.10	-0.14	-0.12	-0.18	-0.15	-0.11	-0.21	-0.12	-0.18
Electrical Apparatus and Supplies......	-0.32	-0.38	-0.25	-0.33	-0.26	-0.29	-0.27	-0.35	-0.27	-0.26	-0.29	-0.31	-0.26	-0.24
Chemical Products.............	+0.21	+0.16	+0.19	+0.22	+0.14	+0.38	+0.25	+0.33	+0.31	+0.23	+0.24	+0.32	+0.23	+0.21

* The change in employment shares between years one and two is correlated with wage-earnings in year one in the Metropolitan area in Montreal.

TABLE 18

3. COEFFICIENTS OF CORRELATION OF ANNUAL CHANGES (Percentage Points) IN THE EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS OF EACH INDUSTRY AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS - ONTARIO 1946-1960*

Wage Earnings → Changes in Employment Shares ↓	Pulp and Paper Mills	Smelting and Refining	Petroleum Refining	Slaughtering and Meat Packing	Motor Vehicles Manufacturing	Iron and Steel Mills	Sawmills incl. Shingles	Manufacture of Industrial Chemicals	Fish Products Industry	Miscellaneous Food Manufacturing	Miscellaneous Machinery and Equipment	Metal Stamping Pressing	Printing and Publishing	Bakeries	Distilleries	Aircraft and Parts Manufacturing	Fruit and Vegetable Canners	Butter, Cheese, etc.	Veneer and Plywood	Men's Clothing Factories	Women's Clothing Factories	Breweries	Electrical Apparatus and Supplies	Synthetic Textile Mills	Cotton, Yarn and Cloth	Sash and Door Planing Mills	Printing and Book-binding	Tobacco Products	Wire and Wire Products	Flour and Feed Mills	Miscellaneous Metal Fabricating	Manufacture of Pharmaceuticals	Fabricated Structural Metal	Soft Drink Manufacturing	Furniture Manufacturing	Other Paper Converters	Railroad Rolling Stock	Rubber Industry	Shoe Factories and Repairs	Shipbuilding and Repairs
Pulp and Paper Mills	+0.09	+0.09	+0.12	+0.06	+0.10	+0.11	+0.08	+0.07	+0.08	+0.17	+0.13	+0.10	+0.12	+0.16	+0.09	+0.26	+0.09	+0.14	+0.02	+0.10	-0.10	+0.10	+0.05	+0.05	+0.07	+0.06	+0.07	+0.02	+0.07	+0.08	+0.08	+0.12	+0.17	+0.08	+0.11	+0.12	+0.05	+0.12	+0.01	+0.12
Smelting and Refining	-0.02	-0.07	-0.01	+0.03	+0.10	-0.04	+0.00	+0.01	-0.02	+0.01	-0.06	-0.01	-0.03	+0.02	-0.03	-0.33	[illegible]	-0.04	-0.02	-0.01	+0.16	-0.04	-0.01	-0.15	-0.00	+0.05	-0.02	+0.07	+0.06	+0.09	-0.03	+0.03	-0.02	+0.16	-0.02	-0.01	-0.03	-0.05	-0.08	[illegible]
Petroleum Refining	-0.08	-0.11	-0.06	-0.10	-0.06	-0.15	-0.12	-0.11	-0.09	-0.04	-0.09	-0.05	-0.11	-0.11	-0.14	-0.33	-0.15	-0.08	-0.18	[illegible]	[illegible]	-0.05	-0.10	-0.12	-0.10	[illegible]	[illegible]	-0.16	[illegible]	-0.11	[illegible]	-0.07	-0.24	-0.08	-0.07	-0.08	-0.16	-0.05	-0.06	-0.04
Slaughtering and Meat Packing	+0.45	+0.42	+0.38	+0.40	+0.41	+0.41	+0.33	+0.39	+0.46	+0.45	+0.41	+0.46	+0.41	+0.39	+0.35	[illegible]	[illegible]	+0.43	+0.42	+0.45	+0.28	+0.39	+0.41	+0.40	+0.36	+0.39	+0.37	+0.30	+0.37	+0.32	+0.39	+0.41	+0.47	[illegible]	+0.41	+0.39	+0.28	+0.49	[illegible]	[illegible]
Motor Vehicles Manufacturing	-0.20	-0.20	-0.19	-0.16	-0.21	-0.25	-0.16	-0.17	-0.18	-0.26	-0.23	-0.17	-0.22	[illegible]	-0.17	-0.15	-0.16	-0.22	-0.16	-0.24	-0.07	-0.20	-0.16	-0.17	-0.16	-0.14	-0.16	-0.10	[illegible]	-0.17	-0.18	-0.18	-0.26	[illegible]	-0.21	-0.20	-0.15	[illegible]	-0.17	[illegible]
Iron and Steel Mills	+0.10	+0.06	+0.16	+0.16	+0.15	+0.11	+0.19	+0.17	+0.11	+0.04	+0.09	[illegible]	+0.10	[illegible]	+0.19	[illegible]	[illegible]	+0.12	[illegible]	[illegible]	[illegible]	-0.06	[illegible]	-0.06	+0.15	[illegible]	+0.17	[illegible]	[illegible]	[illegible]	[illegible]	+0.16	+0.38	[illegible]	+0.13	+0.12	+0.11	[illegible]	[illegible]	[illegible]
Sawmills (incl. Shingles)	-0.40	-0.45	-0.37	-0.37	-0.45	-0.40	-0.27	[illegible]	-0.36	-0.42	-0.42	[illegible]	-0.41	[illegible]	-0.31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.49	-0.41	-0.55	-0.37	[illegible]	[illegible]	-0.27	[illegible]	[illegible]	-0.41	[illegible]	[illegible]	[illegible]	-0.42	-0.41	-0.44	[illegible]	[illegible]	[illegible]
Manufacture of Industrial Chemicals	+0.46	+0.48	+0.55	+0.56	+0.54	+0.55	+0.72	+0.57	+0.48	+0.51	+0.52	[illegible]	+0.50	[illegible]	+0.61	[illegible]	[illegible]	+0.52	+0.48	[illegible]	[illegible]	+0.42	[illegible]	+0.14	+0.53	[illegible]	[illegible]	+0.64	[illegible]	[illegible]	+0.52	[illegible]	[illegible]	[illegible]	[illegible]	+0.49	+0.50	[illegible]	+0.47	+0.46
Wire and Wire Products	+0.20	[illegible]	[illegible]	+0.30	+0.30	+0.29	+0.44	[illegible]	+0.17	+0.25	+0.26	[illegible]	[illegible]	[illegible]	+0.37	+0.10	[illegible]	+0.45	+0.20	[illegible]	+0.18	+0.16	[illegible]	-0.03	+0.27	[illegible]	[illegible]	+0.44	+0.28	[illegible]	+0.27	[illegible]	[illegible]	[illegible]	[illegible]	+0.24	+0.28	+0.16	+0.14	[illegible]
Miscellaneous Food Products	-0.03	-0.00	[illegible]	+0.01	[illegible]	+0.03	[illegible]	+0.01	[illegible]	[illegible]	-0.01	[illegible]	-0.00	[illegible]	-0.00	[illegible]	[illegible]	-0.03	-0.05	+0.03	[illegible]	-0.05	[illegible]	-0.06	-0.05	[illegible]	[illegible]	[illegible]	-0.01	[illegible]	-0.00	[illegible]	[illegible]	-0.03	[illegible]	-0.05	+0.12	+0.01	-0.06	[illegible]
Miscellaneous Machinery and Equipment	+0.05	[illegible]	-0.02	-0.06	+0.00	-0.03	[illegible]	-0.05	[illegible]	[illegible]	-0.02	-0.01	[illegible]	[illegible]	-0.03	[illegible]	+0.01	+0.01	-0.07	[illegible]	[illegible]	+0.05	[illegible]	+0.19	+0.02	-0.04	[illegible]	-0.11	-0.01	[illegible]	-0.03	+0.01	-0.00	[illegible]	[illegible]	+0.02	-0.08	+0.05	[illegible]	-0.01
Metal Stamping, Pressing	+0.07	+0.13	+0.10	+0.06	+0.00	[illegible]	+0.15	0.02	+0.09	+0.09	+0.14	[illegible]	+0.40	[illegible]	+0.13	+0.04	[illegible]	+0.12	+0.09	+0.11	[illegible]	+0.07	[illegible]	-0.06	+0.08	+0.05	[illegible]	+0.06	[illegible]	[illegible]	+0.10	[illegible]	[illegible]	-0.07	+0.09	+0.08	+0.08	+0.09	+0.10	[illegible]
Printing and Publishing	-0.00	+0.03	+0.01	-0.02	[illegible]	+0.00	+0.01	-0.01	-0.07	+0.08	+0.02	[illegible]	+0.01	[illegible]	-0.02	+0.00	[illegible]	[illegible]	-0.09	[illegible]	[illegible]	+0.02	[illegible]	+0.04	-0.01	[illegible]	[illegible]	[illegible]	-0.00	[illegible]	-0.01	[illegible]	[illegible]	-0.06	-0.00	-0.01	+0.09	+0.04	+0.00	[illegible]
Bakeries	+0.50	+0.53	[illegible]	+0.49	+0.52	[illegible]	[illegible]	[illegible]	+0.47	+0.57	+0.54	[illegible]	[illegible]	[illegible]	+0.52	+0.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.50	+0.50	+0.45	+0.50	+0.48	[illegible]	+0.49	[illegible]	[illegible]	+0.50	+0.49	[illegible]	+0.46	+0.50	+0.50	[illegible]	+0.52	[illegible]	[illegible]
Distilleries	+0.49	+0.48	+0.46	[illegible]	+0.45	[illegible]	[illegible]	+0.45	[illegible]	+0.50	+0.49	[illegible]	[illegible]	[illegible]	+0.46	[illegible]	[illegible]	+0.48	[illegible]	[illegible]	[illegible]	+0.51	+0.45	+0.43	+0.50	[illegible]	[illegible]	+0.41	[illegible]	+0.45	[illegible]	+0.44	[illegible]	+0.36	+0.47	+0.47	+0.33	+0.49	[illegible]	+0.45
Aircraft and Parts Manufacturing	-0.35	-0.35	-0.42	-0.39	-0.40	-0.38	[illegible]	-0.40	[illegible]	[illegible]	-0.36	-0.31	[illegible]	[illegible]	-0.39	[illegible]	-0.47	-0.38	-0.30	[illegible]	[illegible]	-0.34	[illegible]	-0.32	-0.34	-0.41	[illegible]	[illegible]	[illegible]	[illegible]	-0.37	[illegible]	[illegible]	-0.50	[illegible]	-0.38	[illegible]	-0.35	[illegible]	[illegible]
Fruit and Vegetable Canning	[illegible]	+0.37	[illegible]	[illegible]	+0.38	+0.31	[illegible]	[illegible]	[illegible]	+0.42	+0.37	+0.36	+0.37	[illegible]	+0.34	[illegible]	[illegible]	+0.36	+0.37	+0.40	+0.14	+0.34	[illegible]	+0.33	+0.37	[illegible]	[illegible]	[illegible]	[illegible]	+0.44	+0.37	+0.38	+0.43	[illegible]	+0.36	+0.38	[illegible]	+0.35	[illegible]	[illegible]
Butter, Cheese, etc.	[illegible]	+0.37	+0.27	+0.35	+0.30	+0.29	+0.25	+0.30	[illegible]	+0.37	+0.35	[illegible]	[illegible]	[illegible]	+0.25	+0.41	[illegible]	+0.34	+0.45	+0.38	[illegible]	+0.32	[illegible]	+0.35	+0.26	+0.31	+0.21	[illegible]	[illegible]	0.24	+0.36	+0.34	+0.39	+0.24	+0.26	+0.32	+0.32	+0.40	[illegible]	[illegible]
Cotton, Yarn and Cloth	-0.71	-0.67	-0.72	-0.73	-0.74	-0.69	-0.73	[illegible]	-0.76	-0.70	-0.70	-0.78	[illegible]	[illegible]	-0.73	-0.60	[illegible]	-0.73	-0.69	-0.66	[illegible]	-0.68	-0.71	-0.50	-0.73	-0.76	-0.72	-0.75	-0.75	-0.79	-0.69	-0.73	[illegible]	-0.78	-0.71	-0.72	[illegible]	-0.67	[illegible]	-0.68
Men's Clothing Factories	-0.08	-0.07	[illegible]	-0.09	[illegible]	-0.09	-0.07	[illegible]	-0.10	-0.04	-0.09	-0.03	-0.11	[illegible]	-0.14	[illegible]	[illegible]	-0.10	[illegible]	+0.02	[illegible]	-0.12	-0.10	-0.13	-0.13	-0.11	-0.14	.14	-0.11	[illegible]	-0.09	-0.12	[illegible]	[illegible]	-0.10	-0.12	-0.20	-0.05	-0.11	-0.10
Women's Clothing Factories	-0.11	-0.13	-0.05	-0.07	[illegible]	[illegible]	[illegible]	-0.05	[illegible]	[illegible]	-0.10	-0.11	[illegible]	[illegible]	-0.07	[illegible]	[illegible]	-0.08	-0.19	-0.12	[illegible]	-0.14	[illegible]	-0.26	-0.15	[illegible]	-0.11	[illegible]	-0.09	-0.14	-0.12	[illegible]	[illegible]	[illegible]	-0.09	-0.04	[illegible]	-0.08	-0.11	[illegible]
Breweries	-0.14	-0.14	[illegible]	-0.13	-0.11	-0.17	-0.14	-0.14	-0.15	-0.37	-0.13	[illegible]	-0.14	[illegible]	-0.16	[illegible]	[illegible]	-0.12	[illegible]	-0.21	[illegible]	-0.05	[illegible]	-0.15	-0.13	[illegible]	-0.14	-0.14	[illegible]	-0.14	-0.15	[illegible]	[illegible]	[illegible]	[illegible]	-0.13	-0.14	-0.14	[illegible]	[illegible]
Electrical Apparatus and Supplies	-0.27	[illegible]	-0.29	-0.28	-0.29	[illegible]	[illegible]	[illegible]	[illegible]	-0.33	-0.33	[illegible]	[illegible]	[illegible]	-0.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.39	[illegible]	-0.62	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.32	[illegible]	-0.37	[illegible]	[illegible]	-0.34	-0.28	-0.42	[illegible]	[illegible]
Synthetic Textile Mills	+0.43	+0.51	+0.46	+0.46	+0.43	+0.43	+0.43	+0.44	[illegible]	+0.49	+0.48	[illegible]	[illegible]	[illegible]	+0.44	[illegible]	[illegible]	+0.42	+0.45	[illegible]	[illegible]	+0.49	[illegible]	+0.54	.44	[illegible]	[illegible]	+0.47	[illegible]	[illegible]	+0.51	[illegible]	[illegible]	[illegible]	[illegible]	+0.48	+0.66	+0.45	[illegible]	[illegible]
Motor Vehicle Parts and Supplies	[illegible]	[illegible]	-0.40	-0.39	-0.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.39	[illegible]	[illegible]	[illegible]	-0.36	[illegible]	[illegible]	-0.39	-0.30	[illegible]	[illegible]	-0.37	[illegible]	-0.20	-0.36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.37	-0.40	[illegible]	[illegible]	[illegible]	-0.39	-0.34	-0.39	[illegible]	-0.40
Sash and Door Planing Mills	[illegible]	[illegible]	-0.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.51	[illegible]	[illegible]	[illegible]	-0.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.47	[illegible]	-0.42	-0.52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.52	-0.50	[illegible]	[illegible]	[illegible]	-0.51	-0.40	-0.50	[illegible]	[illegible]
Printing and Book Binding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.09	[illegible]	[illegible]	[illegible]	-0.21	[illegible]	[illegible]	-0.12	[illegible]	[illegible]	[illegible]	.03	[illegible]	-0.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.11	[illegible]	-0.03	[illegible]	[illegible]	-0.10	-0.02	-0.01	[illegible]	[illegible]
Tobacco Products	+0.57	+0.72	[illegible]	[illegible]	[illegible]	[illegible]	+0.64	[illegible]	+0.65	[illegible]	+0.71	[illegible]	[illegible]	[illegible]	.69	[illegible]	[illegible]	+0.71	[illegible]	[illegible]	[illegible]	+0.67	[illegible]	.68	.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.67	[illegible]	[illegible]	[illegible]	+0.57	+0.67	+0.64	+0.69	[illegible]	[illegible]
Agricultural Implements	[illegible]	-0.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	[illegible]	[illegible]	-0.12	[illegible]	[illegible]	[illegible]	-0.24	[illegible]	[illegible]	-0.15	[illegible]	.04	-0.17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.15	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	-0.05	[illegible]	[illegible]
Flour and Feed Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.76	[illegible]	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	.67	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	+0.53	[illegible]	.23	.61	[illegible]	[illegible]	+0.72	+0.64	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	[illegible]	+0.58	[illegible]	+0.50	[illegible]	[illegible]
Paper Boxes and Bags	[illegible]	+0.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.59	[illegible]	+0.55	.55	[illegible]	[illegible]	[illegible]	+0.57	[illegible]	+0.58	[illegible]	[illegible]	[illegible]	[illegible]	+0.55	+0.71	+0.55	[illegible]	[illegible]
Manufacture of Pharmaceuticals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.60	[illegible]	[illegible]	[illegible]	.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.56	[illegible]	+0.42	.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.58	[illegible]	[illegible]	[illegible]	[illegible]	+0.57	+0.50	+0.57	[illegible]	[illegible]
Fabricated Structural Metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.12	[illegible]	[illegible]	[illegible]	.13	[illegible]	[illegible]	+0.14	[illegible]	[illegible]	[illegible]	.06	[illegible]	.07	+0.13	[illegible]	[illegible]	[illegible]	+0.14	[illegible]	+0.16	[illegible]	[illegible]	[illegible]	[illegible]	.14	[illegible]	+0.15	[illegible]	[illegible]
Soft Drink Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.27	[illegible]	[illegible]	[illegible]	-0.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.29	[illegible]	.37	.34	[illegible]	[illegible]	-0.26	[illegible]	[illegible]	-0.27	[illegible]	[illegible]	[illegible]	[illegible]	-0.31	[illegible]	-0.26	[illegible]	[illegible]
Furniture Manufacturing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.21	[illegible]	[illegible]	[illegible]	-0.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.17	[illegible]	.31	-0.26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.21	[illegible]	[illegible]	-0.16	[illegible]	-0.24	[illegible]	-0.26	[illegible]	[illegible]
Other Paper Converters	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.11	[illegible]	[illegible]	[illegible]	-0.15	[illegible]	[illegible]	-0.15	[illegible]	[illegible]	[illegible]	-0.14	[illegible]	-0.14	-0.17	[illegible]	-0.14	[illegible]	-0.14	[illegible]	-0.12	[illegible]	[illegible]	[illegible]	[illegible]	-0.15	-0.00	-0.11	[illegible]	[illegible]
Railroad Rolling Stock	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.34	[illegible]	[illegible]	[illegible]	-0.33	[illegible]	[illegible]	[illegible]	[illegible]	-0.21	[illegible]	-0.30	[illegible]	-0.28	-0.27	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	-0.31	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	-0.45	-0.25	[illegible]	[illegible]
Rubber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.16	[illegible]	+0.23	[illegible]	[illegible]	[illegible]	+0.21	[illegible]	[illegible]	[illegible]	+0.21	+0.16	+0.17	+0.29	[illegible]	+0.34	+0.23	[illegible]	[illegible]	[illegible]	[illegible]	+0.21	+0.23	[illegible]	+0.18	[illegible]	+0.18	+0.25	[illegible]	+0.19	[illegible]	+0.26
Shoe Factories and Repairs	[illegible]	+0.31	+0.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.31	[illegible]	+0.31	[illegible]	+0.27	[illegible]	[illegible]	[illegible]	+0.24	+0.30	+0.45	+0.32	[illegible]	+0.30	+0.26	[illegible]	[illegible]	+0.26	+0.28	[illegible]	+0.31	[illegible]	[illegible]	[illegible]	[illegible]	+0.27	+0.41	+0.35	[illegible]	0.35
Shipbuilding and Repairs	[illegible]	-0.07	[illegible]	[illegible]	[illegible]	+0.00	[illegible]	[illegible]	[illegible]	[illegible]	-0.04	+0.00	[illegible]	[illegible]	-0.02	[illegible]	-0.12	-0.00	-0.01	[illegible]	[illegible]	-0.12	[illegible]	-0.09	-0.06	[illegible]	[illegible]	-0.12	-0.12	[illegible]	-0.08	-0.08	-0.01	-0.17	-0.05	-0.06	-0.22	-0.02	-0.10	-0.13

*The change in employment shares between years one and two is correlated with wage-earnings in year one.

TABLE 19

3. COEFFICIENTS OF CORRELATION OF ANNUAL CHANGES (Percentage Points) IN THE EMPLOYMENT SHARES OF MALE PRODUCTION WORKERS OF EACH INDUSTRY AND ANNUAL AVERAGE WEEKLY WAGE EARNINGS - CANADA 1946-1960*

Wage Earnings Changes in Employment Shares	Pulp and Paper Mills	Smelting and Refining	Petroleum Refining	Slaughtering and Meat Packing	Motor Vehicles Manufacturing	Iron and Steel Mills	Sawmills (incl. Shingles)	Manufacture of Industrial Chemicals	Fish Products Industry	Miscellaneous Food Manufacturing	Miscellaneous Machinery and Equipment	Metal Stamping, Pressing	Printing and Publishing	Bakeries	Distilleries	Aircraft and Parts Manufacturing	Fruit and Vegetable Canners	Butter, Cheese, etc.	Veneer and Plywood	Men's Clothing Factories	Women's Clothing Factories	Breweries	Electrical Apparatus and Supplies	Synthetic Textile Mills	Cotton, Yarn and Cloth	Sash and Door Planing Mills	Printing and Book-binding	Tobacco Products	Wire and Wire Products	Flour and Feed Mills	Miscellaneous Metal Fabricating	Manufacture of Pharmaceuticals	Fabricated Structural Metal	Soft Drink Manufacturing	Furniture Manufacturing	Other Paper Converters	Railroad Rolling Stock	Rubber Industry	Shoe Factories and Repairs	Shipbuilding and Repairs
Pulp and Paper Mills	+0.08	+0.09	+0.10	+0.06	+0.14	+0.07	+0.07	+0.07	+0.03	+0.11	+0.09	+0.08	+0.10	+0.10	+0.04	+0.14	+0.13	+0.08	+0.09	+0.12	+0.06	+0.11	+0.00	+0.08	+0.06	+0.07	+0.08	+0.07	+0.05	+0.07	+0.14	+0.08	+0.11	+0.13	+0.09	+0.09	+0.13	+0.10	+0.12	+0.11
Smelting and Refining	-0.28	-0.27	-0.25	-0.25	-0.21	-0.29	-0.28	-0.25	-0.21	-0.25	-0.26	-0.25	-0.25	[illegible]	-0.27	-0.16	-0.16	-0.24	-0.27	-0.27	-0.29	-0.23	-0.38	-0.29	-0.32	-0.26	-0.24	-0.25	-0.30	-0.25	-0.20	-0.25	-0.27	-0.20	-0.26	-0.27	-0.24	-0.25	-0.23	-0.23
Petroleum Refining	-0.09	-0.15	-0.14	-0.18	-0.16	-0.18	-0.14	-0.17	-0.25	-0.17	-0.13	-0.16	-0.18	-0.18	-0.22	-0.15	-0.17	-0.17	-0.11	-0.12	-0.19	-0.14	-0.15	-0.12	-0.14	-0.19	-0.20	-0.15	-0.15	-0.15	-0.09	-0.14	-0.11	-0.18	-0.16	-0.14	-0.13	-0.13	-0.21	-0.18
Slaughtering and Meat Packing	+0.60	+0.57	+0.53	+0.52	+0.51	+0.54	+0.59	+0.55	+0.55	+0.54	+0.55	+0.57	+0.53	+0.53	+0.50	+0.52	+0.54	+0.53	+0.58	+0.56	+0.47	+0.52	+0.54	+0.60	+0.52	+0.53	+0.52	+0.55	+0.56	+0.49	+0.57	+0.62	+0.56	+0.47	+0.55	+0.56	+0.55	+0.56	+0.36	+0.51
Motor Vehicles Manufacturing	-0.38	-0.37	-0.39	-0.36	-0.40	-0.41	-0.35	-0.37	-0.30	-0.38	-0.33	-0.39	-0.38	-0.36	-0.35	-0.36	-0.36	-0.37	-0.38	-0.42	-0.32	-0.38	-0.32	-0.36	-0.34	-0.36	-0.35	-0.33	-0.38	-0.39	-0.36	-0.34	-0.38	-0.39	-0.39	-0.38	-0.36	-0.39	-0.40	-0.34
Iron and Steel Mills	+0.01	+0.02	+0.02	+0.07	+0.05	+0.04	+0.04	+0.06	+0.16	+0.05	+0.02	+0.04	[illegible]	[illegible]	+0.09	+0.07	+0.04	+0.07	+0.02	-0.01	+0.01	+0.02	[illegible]	-0.00	-0.01	+0.07	+0.05	+0.04	+0.03	+0.03	+0.02	+0.16	+0.00	+0.05	+0.04	+0.02	+0.01	+0.03	+0.02	+0.07
Sawmills (incl. Shingles)	[illegible]	-0.21	-0.20	[illegible]	-0.24	[illegible]	[illegible]	-0.21	-0.13	-0.21	-0.25	-0.20	[illegible]	[illegible]	[illegible]	-0.19	[illegible]	-0.19	[illegible]	-0.26	-0.18	-0.21	+0.44	-0.22	-0.25	-0.20	-0.19	[illegible]	-0.27	-0.21	-0.26	-0.23	-0.25	-0.17	-0.22	-0.23	-0.20	-0.27	-0.10	-0.16
Manufacture of Industrial Chemicals	[illegible]	+0.46	+0.48	+0.50	+0.50	+0.51	+0.40	+0.50	+0.50	+0.49	+0.48	+0.47	[illegible]	[illegible]	+0.51	+0.51	[illegible]	+0.48	+0.42	+0.50	+0.47	+0.49	[illegible]	+0.44	[illegible]	+0.49	+0.50	[illegible]	+0.47	[illegible]	[illegible]	+0.45	+0.46	[illegible]	+0.48	+0.46	[illegible]	+0.51	+0.47	+0.52
Fish Products Industry	+0.07	+0.08	+0.08	+0.09	+0.15	+0.07	+0.07	+0.09	+0.14	+0.10	+0.08	+0.09	+0.10	[illegible]	[illegible]	+0.11	[illegible]	+0.07	+0.05	+0.12	-0.01	+0.07	-0.01	+0.10	+0.12	+0.08	+0.10	+0.07	+0.05	+0.07	+0.08	+0.08	+0.11	+0.12	+0.10	+0.14	+0.01	+0.09	-0.01	+0.07
Miscellaneous Food Manufacturing	[illegible]	+0.41	[illegible]	[illegible]	+0.46	[illegible]	+0.36	+0.40	+0.34	+0.42	+0.42	+0.40	+0.41	+0.41	+0.39	+0.41	[illegible]	+0.40	+0.39	+0.46	+0.49	+0.42	+0.45	+0.39	+0.38	+0.41	+0.41	+0.38	+0.39	+0.39	+0.40	+0.39	+0.43	+0.45	+0.41	+0.39	[illegible]	+0.43	+0.41	+0.46
Miscellaneous Machinery and Equipment	-0.19	-0.21	-0.23	-0.20	-0.14	-0.21	-0.17	-0.22	[illegible]	-0.19	-0.20	-0.21	-0.18	-0.20	-0.21	-0.18	-0.20	-0.21	-0.18	-0.19	-0.24	-0.22	-0.23	-0.22	[illegible]	-0.19	-0.19	-0.15	-0.17	-0.17	[illegible]	-0.19	-0.19	-0.20	-0.20	-0.18	-0.22	[illegible]	-0.20	-0.27
Metal Stamping, Pressing	-0.23	-0.25	-0.28	-0.31	-0.32	-0.31	-0.19	-0.29	[illegible]	-0.28	-0.27	-0.25	-0.27	-0.27	-0.33	-0.26	-0.27	-0.28	-0.24	-0.29	-0.30	-0.29	[illegible]	-0.21	-0.24	-0.28	-0.28	-0.21	-0.26	-0.33	-0.21	-0.20	-0.23	-0.34	-0.28	-0.26	-0.27	-0.28	-0.29	-0.32
Printing and Publishing	[illegible]	-0.23	-0.22	-0.26	-0.22	-0.24	-0.25	-0.24	[illegible]	-0.21	-0.22	-0.24	-0.23	[illegible]	-0.27	-0.23	-0.20	[illegible]	-0.22	-0.20	-0.16	-0.23	-0.15	-0.24	-0.29	-0.24	[illegible]	-0.27	-0.27	-0.27	[illegible]	-0.21	-0.21	-0.22	-0.24	-0.27	[illegible]	-0.21	-0.21	[illegible]
Bakeries	+0.43	+0.43	+0.44	+0.40	+0.40	+0.41	+0.41	+0.42	[illegible]	+0.43	+0.43	+0.43	+0.42	+0.43	+0.39	+0.44	+0.44	+0.42	+0.42	[illegible]	+0.45	+0.43	+0.42	+0.45	+0.35	+0.41	+0.41	+0.39	+0.39	+0.36	+0.42	+0.45	+0.46	+0.41	+0.42	+0.41	+0.34	+0.45	[illegible]	+0.48
Distilleries	[illegible]	-0.06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	-0.05	[illegible]	-0.11	[illegible]	-0.01	[illegible]	[illegible]	[illegible]	+0.02	[illegible]	[illegible]	[illegible]	[illegible]	-0.05	-0.25	+0.30	[illegible]	-0.21	-0.14	-0.07	-0.02	[illegible]	-0.02	[illegible]	-0.13
Aircraft and Parts Manufacturing	[illegible]	-0.13	-0.14	[illegible]	[illegible]	[illegible]	-0.12	[illegible]	-0.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.17	[illegible]	-0.17	-0.13	[illegible]	[illegible]	[illegible]	-0.13	-0.08	[illegible]	[illegible]	-0.16	[illegible]	-0.07	[illegible]	[illegible]	-0.16	-0.10	[illegible]	[illegible]	-0.06	[illegible]	-0.10	-0.06	[illegible]
Fruit and Vegetable Canners	[illegible]	+0.47	[illegible]	[illegible]	[illegible]	+0.42	[illegible]	[illegible]	+0.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.54	[illegible]	+0.43	+0.47	[illegible]	[illegible]	[illegible]	[illegible]	+0.43	[illegible]	[illegible]	+0.50	+0.43	+0.48	+0.46	+0.52	[illegible]	+0.53	+0.51	[illegible]	[illegible]	[illegible]	+0.49	[illegible]	+0.47
Butter, Cheese, etc.	[illegible]	+0.27	[illegible]	[illegible]	[illegible]	+0.31	[illegible]	+0.28	[illegible]	[illegible]	+0.31	+0.24	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	+0.29	[illegible]	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	+0.27	[illegible]	+0.31	+0.21	+0.27	[illegible]	[illegible]	[illegible]	+0.29	+0.26	[illegible]	+0.32	[illegible]	+0.31
Veneer and Plywood	[illegible]	-0.04	[illegible]	[illegible]	-0.11	-0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.07	-0.07	[illegible]	-0.06	[illegible]	[illegible]	[illegible]	-0.11	[illegible]	-0.13	-0.18	-0.01	[illegible]	[illegible]	[illegible]	-0.11	-0.08	[illegible]	-0.13	-0.16	-0.08	-0.08	-0.17	[illegible]	[illegible]	-0.10	-0.05	-0.12
Men's Clothing Factories	[illegible]	-0.19	[illegible]	[illegible]	[illegible]	-0.16	[illegible]	-0.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.25	[illegible]	-0.19	-0.17	[illegible]	-0.14	-0.18	-0.11	-0.22	[illegible]	[illegible]	-0.22	[illegible]	-0.18	-0.13	[illegible]	-0.22	-0.21	[illegible]	[illegible]	[illegible]	[illegible]	-0.18	[illegible]	-0.17
Women's Clothing Factories	[illegible]	-0.20	-0.19	[illegible]	-0.14	-0.19	[illegible]	-0.18	-0.20	-0.15	[illegible]	[illegible]	[illegible]	-0.17	[illegible]	-0.21	[illegible]	-0.18	-0.13	-0.18	[illegible]	-0.17	[illegible]	-0.24	-0.27	[illegible]	[illegible]	[illegible]	-0.23	[illegible]	[illegible]	-0.17	[illegible]	-0.15	-0.14	-0.24	[illegible]	[illegible]	[illegible]	[illegible]
Breweries	[illegible]	+0.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	+0.24	[illegible]	[illegible]	[illegible]	[illegible]	+0.25	+0.27	[illegible]	[illegible]	[illegible]	+0.23	+0.22	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Electrical Apparatus and Supplies	[illegible]	-0.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.32	[illegible]	[illegible]	[illegible]	[illegible]	-0.26	-0.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Synthetic Textile Mills	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cotton, Yarn and Cloth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.22	[illegible]	[illegible]	-0.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.12
Sash and Door Planing Mills	[illegible]	-0.49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Printing and Book-binding	[illegible]	-0.25	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tobacco Products	[illegible]	+0.72	+0.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.73	[illegible]	[illegible]	[illegible]	[illegible]	+0.69	[illegible]	+0.70	+0.71	+0.74	[illegible]	+0.70	[illegible]	+0.74	+0.72	[illegible]	[illegible]	[illegible]	+0.72	[illegible]	[illegible]	+0.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wire and Wire Products	[illegible]	+0.29	+0.28	[illegible]	+0.32	[illegible]	+0.27	[illegible]	[illegible]	[illegible]	+0.25	[illegible]	[illegible]	[illegible]	[illegible]	+0.30	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	[illegible]	[illegible]	+0.26	+0.28	[illegible]	[illegible]	+0.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.35
Flour and Feed Mills	[illegible]	+0.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.25	[illegible]	[illegible]	[illegible]	[illegible]	+0.24	[illegible]	[illegible]	+0.26	[illegible]	[illegible]	[illegible]	[illegible]	+0.29	[illegible]	[illegible]	+0.21	[illegible]	+0.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous Metal Fabricating	[illegible]	+0.07	[illegible]	[illegible]	+0.17	+0.11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.07	[illegible]	[illegible]	[illegible]	[illegible]	+0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacture of Pharmaceuticals	[illegible]	+0.23	[illegible]	[illegible]	+0.14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.27	[illegible]	[illegible]	+0.21	[illegible]	[illegible]	[illegible]	[illegible]	+0.23	[illegible]	[illegible]	[illegible]	[illegible]	+0.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fabricated Structural Metal	[illegible]	-0.15	[illegible]	[illegible]	-0.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.12	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.12	[illegible]	[illegible]	-0.14	[illegible]	-0.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Soft Drink Manufacturing	[illegible]	-0.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Furniture Manufacturing	[illegible]	-0.26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.26	[illegible]	[illegible]	-0.22	[illegible]	[illegible]	-0.26	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.17
Other Paper Converters	[illegible]	-0.10	[illegible]	[illegible]	-0.07	-0.11	-0.14	-0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.11	[illegible]	-0.11	-0.11	[illegible]	-0.14	[illegible]	[illegible]	[illegible]	[illegible]	-0.06	[illegible]	-0.11	-0.05	-0.10	-0.10	[illegible]
Railroad Rolling Stock	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.29	[illegible]	[illegible]	[illegible]	[illegible]	-0.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.30	[illegible]	[illegible]	[illegible]	[illegible]	-0.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.26	[illegible]	[illegible]	[illegible]	[illegible]
Rubber Industry	[illegible]	+0.14	[illegible]	[illegible]	+0.11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.17	+0.14	+0.14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.14	[illegible]	[illegible]	[illegible]	+0.17	+0.13	[illegible]	+0.16	+0.11	+0.14	+0.17	[illegible]	+0.13	[illegible]	+0.10	[illegible]	[illegible]
Shoe Factories and Repairs	[illegible]	+0.56	+0.54	[illegible]	+0.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.53	[illegible]	[illegible]	+0.49	[illegible]	+0.52	+0.57	[illegible]	[illegible]	[illegible]	[illegible]	+0.56	[illegible]	[illegible]	[illegible]	[illegible]	+0.54	[illegible]	+0.54	[illegible]	+0.54	+0.51	[illegible]	[illegible]	[illegible]	+0.57	[illegible]	+0.56
Shipbuilding and Repairs	[illegible]	+0.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.17	+0.17	[illegible]	+0.18	+0.14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+0.21	[illegible]	[illegible]	[illegible]	[illegible]	+0.23	[illegible]	+0.20	[illegible]	[illegible]	[illegible]	[illegible]	+0.24	[illegible]	+0.20	[illegible]	[illegible]

*The change in employment shares between years one and two is correlated with wage-earnings in year one.

tion coefficients there would still remain the formidable problem of drawing meaningful inferences regarding the validity of the theory from these perplexing results.

OECD experts, when faced with a somewhat less complex set of results were at pains to emphasize the difficulties inherent in interpreting the correlation coefficients arising out of their study. This led the experts to preface their analysis with the following remarks:

> *Considerable use has been made of correlation analysis, and to this extent the results are not merely open to alternative interpretation, but in some cases are not relevant to certain of the most important aspects of the question under examination. Some of these difficulties are inherent in all correlation analysis, i.e. whether an observed association is merely a joint response by the variables under study to some outside influences which operate on both, or whether it is in fact a casual relationship and if so, what is the direction of causality. This is particularly important in the study of the allocative role of wages.*[24]

Against this background the experts launched into a detailed discussion of a whole range of plausible interpretations of the various correlation coefficients which emerged from their study. Lack of statistically significant associations were attributed to such widely divergent factors as, the aggregation of a spectrum of demand functions for different classes of labour within an industry or set of industries; changes in the degree of mechanisation of some industries; failure to capture the impact of differences in fringe benefits and non-pecuniary working conditions among industries; the possible inappropriateness of the time lags used; the allocative role of job vacancies, etc., etc. Although these possible explanations of the results may be quite valid in certain cases they should be considered

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(24) O.E.C.D., *Wages and Labour Mobility,* Paris, 1965, pp. 89-90.

only after a serious attempt has been made to ascertain the extent to which the theory which is being tested holds.

Since a theory is neither true nor false, but more or less false, it follows that the first priority should be to examine the evidence as a whole in order to try and establish the extent to which the theory holds. Thereafter, one may go on to discuss as fully as possible what appears to be evidence of significant departures from the predictions of the theory. This approach recognizes that correlation analysis can and does lend itself to a multiplicity of interpretations, but is more likely to do so when the problem to which the technique is addressed is not clearly and precisely articulated. Had OECD adhered strictly to this principle its analysis would in all probability be more closely akin to a critical test of the theory. The following statement is a prime example of OECD's approach:

> *To the extent that the analysis does indicate an association between earnings and employment changes, this is consistent with the view that wages are fulfilling an allocative role, i.e. that wage changes are operating to redistribute labour as a direct response to changes in demand for labour. But it is also consistent with the view that when demand rises in a given sector, employment will increase as a result of the newly available job vacancies at the same time as conditions are created which encourage unions to demand, and employers to grant, above-average wage increases, i.e. that the existence of job vacancies suffices to induce manpower to come forward at the current wage.*[25]

Having recognized the possible existence of the two broad categories of industries, viz:

1) industries in which wages appear to be the principal allocator of manpower, and

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(25) Ibid., p. 90.

2) industries in which the existence of vacancies are a major determinant of manpower flows, one would have expected OECD to identify the industries in each group. In so doing the experts would have been able to state the number and type of industries to which the theory seems most applicable.

This may, we suspect, be due to the fact that the OECD placed too much emphasis on correlation analysis, rather than on the implications of the theory.

In the discussion of the sign test it was pointed out that broadly conceived the theory speaks of two categories of industries, viz. those with increasing relative wages and those with decreasing relative wages. These two groups of industries must first be identified before correlation analysis can meaningfully be employed. The sign test generated not two but four categories $(W^{\pm}E_{s}^{\pm})$. Let us now look at the results of the test of hypotheses $E_{si} = A_{ij}W_{j}$, for Ontario in terms of the findings of the sign tests.

At the 5 per cent level, Table 15 indicates that well over 1,200 of the 1,600 correlation coefficients are statistically significant. In the case of Canada, Table 16, the number of significant correlation coefficients is slightly lower, but the possible reasons for this were given earlier in this study. Now what do these results really mean in terms of the validity of the theory? Does a preponderance of significant positive and negative correlation coefficients imply that the theory is predictively adequate for a considerable sector of the labour market? The conventional method of interpreting these results would lead one to infer that wages are indeed performing the role attributed to them by the theory. Such a

conclusion would, however, be completely erroneous, although it should be pointed out that some studies of wages and labour mobility have stated on the basis of similar evidence that wages do operate to redistribute labour among competing industries in the labour market.

In order to understand why such a conclusion is fallacious it is necessary to go back to the sign test and its findings. The sign test, it may be recalled, compared changes in relative wages in each industry with changes in the relative position of employment shares within and among industries. On the other hand, the present test uses absolute wages, and these wages have all been increasing absolutely in every industry through the entire period. At the same time employment shares have increased both negatively and positively throughout the period. Consequently, the results as given in Tables 14, 15, and 16 can only serve to distinguish two categories of industries, viz. $W^+E_S^+$ and $W^+E_S^-$. But the groups of industries to which the theory is readily applicable are $W^+E_S^+$ and $W^-E_S^-$. Thus the findings of the test bear little or no relation to the predictions of the test. This is due to the use of absolute rather than relative wages - because although wages may be increasing absolutely in some industries, yet they may be declining relatively to wages elsewhere.

This accounts for our using the principle and sign tests to differentiate the four groups of industries, $(W^{\pm}E_S^{\pm})$. Once these have been differentiated then one can test the two groups ($W^+E_S^+$ and $W^-E_S^-$) to see the extent to which the implications of the theory hold. At the same time the principle test has assisted us in

pin-pointing the groups of industries $W^+E_s^-$ and $W^-E_s^+$ which were not adequately identified by such studies as the OECD's. In the main, the industries comprising the group $W^+E_s^-$ are capital intensive industries requiring highly specialized workers. Given the nature of the skill requirements of the work force of these industries - the industries tend to be monopsonistic in terms of their competitive position in the labour market. Thus it seems reasonable to infer that relative increases in the wages paid by these industries are more likely the result of productivity changes and trade-union pushfulness than increases in the demand for labour per se. On the other hand, the industries which fall within the category $W^-E_s^+$ tend to be low productivity labour intensive industries to which technologically displaced workers flock because of the existence of vacancies, which for want of a better term may be called employment opportunities.

In spite of the apparent usefulness of the sign test in distinguishing groups of industries, its true empirical value can be assessed only with reference to strength of the association (as measured by correlation coefficients) between trends in relative wages and employment between the two groups of industries $W^+E_s^+$ and $W^-E_s^-$. Since the sign test is couched in terms of relative wages - a critical evaluation of the validity of the findings of the test necessitates the use of wage-differentials.

WAGE AND EMPLOYMENT DIFFERENTIALS

Although the theoretical explanation of inter-industry manpower flows runs in terms of inter-industry wage-differentials - and although the concept of industrial wage differentials has been thoroughly discussed in the literature yet the customary method of measuring these differentials is clearly unsatisfactory, at least for the present study.

We will therefore preface this test by outlining what we consider an appropriate method of measuring inter-industry wage-differentials, and its concomitant inter-industry employment differentials.

Suppose, for example, that at time (t) the average weekly wage-earnings in n industries are $w_1, w_2, w_3, \ldots w_n$, respectively. Then the wage differentials of the first industry with respect to all other industries, can be expressed as $\frac{w2}{w1}, \frac{w3}{w1}, \ldots \frac{wn}{w1}$. Similarly, the wage differentials of second industry with respect to all other industries will be, $\frac{w1}{w2}, \frac{w2}{w2}, \frac{w3}{w2}, \ldots \frac{wn}{w2}$. Applying this principle to n industries we get a n x n matrix in which the diagonal elements are unity. Thus an appropriate way of measuring wage-differentials would seem to be in terms of a matrix which takes the form $W_{ij} = \frac{1}{W_{ji}}$ where the (i, j) th elements are $\frac{wi}{w_j}$ and the (j, i) th elements are $\frac{wj}{wi}$.[26] Using the same method inter-industry employment differentials can be expressed in the form $Eij = \frac{1}{Eji}$. (See Table 20.)

Given these two matrices the relation postulated by the theory becomes $Eij = f(Wij)$ for all (t). If this functional relationship is now applied to the two

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(26) See Table 20 which shows how wages and employment differentials among 20 industries have changed through time.

TABLE 20

EMPLOYMENT DIFFERENTIALS (E_d) AND WAGE DIFFERENTIALS (W_d) AMONG TWENTY OF CANADA'S FORTY LEADING MANUFACTURING INDUSTRIES - SELECTED YEARS*

Industry Numbers		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20	
		E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d	E_d	W_d
1	1946	1.00	1.00	0.33	0.93	0.15	0.91	0.40	0.84	0.49	0.89	0.57	0.93	1.07	0.64	0.12	0.86	0.19	0.61	0.09	0.72	0.53	0.83	0.42	0.81	0.25	0.92	0.50	0.73	0.06	0.82	0.21	0.86	0.20	0.59	[illegible]	0.73	0.10	0.74	0.19	0.79
	1950	1.00	1.00	0.39	0.93	0.15	0.93	0.31	0.86	0.55	0.99	0.59	0.93	1.08	0.65	0.10	0.92	0.17	0.55	0.08	0.72	0.49	0.82	0.38	0.83	0.30	0.92	0.47	0.68	0.05	0.84	0.16	0.89	0.15	0.58	[illegible]	0.68	0.11	0.69	0.20	0.72
	1955	1.00	1.00	0.47	0.98	0.16	1.04	0.29	0.87	0.50	0.94	0.54	1.02	0.99	0.68	0.11	0.96	0.17	0.46	0.08	0.76	0.43	0.84	0.37	0.87	[illegible]	0.77	[illegible]	0.69	0.05	0.89	0.40	0.92	0.14	0.62	0.39	0.71	0.16	0.73	0.16	0.65
	1960	1.00	1.00	0.46	1.00	0.14	1.13	0.31	0.92	0.38	1.03	0.62	1.04	0.73	0.67	0.20	1.02	0.15	0.46	0.09	0.77	0.37	0.86	0.33	0.88	[illegible]	0.79	0.46	0.70	0.05	0.75	0.33	0.91	0.13	0.65	[illegible]	0.74	0.16	0.75	0.14	0.64
2	1946			1.00	1.00	0.47	0.98	1.22	0.90	1.49	0.95	1.75	1.00	3.27	0.69	0.36	0.92	0.59	0.66	0.27	0.77	1.62	0.89	1.27	0.86	1.77	0.98	1.53	0.79	0.17	0.87	0.64	1.03	0.61	0.63	1.06	0.79	0.30	0.79	0.58	0.85
	1950			1.00	1.00	0.39	1.00	0.79	0.92	1.41	1.07	1.51	1.00	2.90	0.70	0.27	0.98	0.43	0.59	0.22	0.77	1.25	0.88	[illegible]	0.89	0.76	0.99	1.21	0.73	0.12	0.90	0.41	0.95	0.38	0.63	0.33	0.72	0.29	0.74	0.53	0.77
	1955			1.00	1.00	[illegible]	1.07	0.63	0.89	1.08	0.96	1.15	1.04	1.91	0.69	0.24	0.98	0.37	0.47	0.17	0.77	0.92	0.86	0.90	0.89	0.59	0.99	0.93	0.71	0.11	0.91	0.87	0.84	0.30	0.63	0.61	0.73	0.33	0.75	0.34	0.67
	1960			1.00	1.00	0.30	1.12	0.68	0.91	0.83	1.03	1.34	1.04	1.58	0.66	0.44	1.02	0.33	0.46	0.19	0.77	0.80	0.85	0.72	0.88	[illegible]	0.88	0.96	0.70	0.10	0.84	0.72	0.90	0.29	0.65	0.91	0.73	0.34	0.75	0.31	0.63
3	1946					1.00	1.00	2.61	0.91	3.16	0.97	3.72	1.02	6.96	0.70	0.77	0.94	1.25	0.67	0.58	0.79	3.45	0.90	2.70	0.88	1.65	1.00	3.75	0.80	0.37	0.88	1.36	1.05	1.31	0.64	[illegible]	0.80	0.64	0.81	1.23	0.86
	1950					1.00	1.00	2.03	0.92	3.61	1.07	3.87	0.99	7.16	0.70	0.69	0.98	1.11	0.59	0.56	0.77	3.20	0.87	2.52	0.89	1.45	0.99	3.09	0.73	0.31	0.90	1.04	0.95	0.98	0.63	2.24	0.72	0.75	0.74	1.35	0.77
	1955					1.00	1.00	1.89	0.84	3.22	0.90	3.45	0.97	5.73	0.65	0.73	0.92	1.10	0.44	0.50	0.73	2.75	0.81	2.37	0.83	1.77	0.93	[illegible]	[illegible]	0.33	0.86	2.59	0.88	0.90	0.59	1.84	0.68	1.00	0.70	1.02	0.63
	1960					1.00	1.00	2.27	0.81	2.78	0.91	4.48	0.92	5.29	0.59	1.47	[illegible]	1.11	0.41	0.63	0.68	2.67	0.76	2.40	0.77	1.98	0.87	2.31	0.62	0.33	0.84	2.37	0.80	0.97	0.57	3.05	0.65	1.15	0.66	1.03	0.56
4	1946							1.00	1.00	1.21	1.06	1.43	1.12	2.67	0.77	0.30	1.03	0.48	0.73	0.22	0.86	1.32	0.99	1.04	0.96	0.63	1.10	1.25	0.87	0.14	0.96	0.52	1.15	0.50	0.70	0.57	0.88	0.25	0.88	0.47	0.94
	1950							1.00	1.00	1.78	1.16	1.91	1.08	3.53	0.76	0.34	1.07	0.55	0.64	0.28	0.84	1.58	0.95	1.24	0.77	0.96	1.07	1.52	0.80	0.15	0.98	0.51	1.03	0.48	0.68	1.10	0.79	0.37	0.81	0.66	0.83
	1955							1.00	1.00	1.71	1.08	1.83	1.16	3.04	0.77	0.39	1.10	0.59	0.53	0.26	0.87	1.46	0.97	1.26	1.00	0.94	1.11	1.48	0.79	0.17	1.02	1.37	1.05	0.48	0.71	0.97	0.81	0.53	0.84	0.54	0.75
	1960							1.00	1.00	1.23	1.13	1.97	1.13	2.33	0.73	0.65	1.11	0.49	0.50	0.28	0.84	1.18	0.93	1.06	0.96	0.77	1.08	1.46	0.76	0.14	1.03	1.05	0.99	0.47	0.71	1.24	0.80	0.50	0.82	0.46	0.69
5	1946									1.00	1.00	1.18	1.05	2.20	0.72	0.24	0.87	0.39	0.69	0.18	0.81	1.09	0.93	0.85	0.91	0.52	1.03	1.03	[illegible]	0.12	0.91	1.43	1.08	0.41	0.66	0.71	0.83	0.20	0.83	0.39	0.89
	1950									1.00	1.00	1.07	0.93	1.99	0.66	0.17	0.92	0.31	0.55	0.16	0.73	0.89	0.82	0.70	0.84	0.54	0.93	0.86	0.69	[illegible]	0.85	1.29	0.89	0.27	0.59	0.62	0.68	0.21	0.70	0.37	0.72
	1955									1.00	1.00	1.07	1.08	1.78	[illegible]	0.23	1.02	0.34	0.49	0.15	0.81	0.85	0.90	0.74	0.93	0.55	1.13	0.97	0.74	0.10	0.95	[illegible]	0.97	0.28	0.66	0.37	0.76	0.31	0.78	0.32	0.70
	1960									1.00	1.00	1.61	1.01	1.90	0.64	0.53	0.99	0.40	0.45	0.23	0.74	0.96	0.83	0.86	0.85	0.71	0.96	1.19	0.68	0.12	0.91	[illegible]	0.88	0.35	[illegible]	1.10	0.71	0.41	0.73	0.37	0.61
6	1946											1.00	1.00	1.87	0.69	0.21	0.92	0.34	0.66	0.16	0.77	0.93	0.89	0.73	[illegible]	[illegible]	[illegible]	0.27	[illegible]	1.30	0.86	1.37	1.02	0.35	[illegible]	[illegible]	0.79	0.17	0.79	0.33	0.84
	1950											1.00	1.00	1.85	0.71	0.18	0.94	0.29	0.59	0.14	0.78	0.93	0.88	0.05	[illegible]	[illegible]	[illegible]	0.30	0.74	0.98	0.91	[illegible]	0.96	0.25	[illegible]	[illegible]	0.73	0.19	0.75	0.35	0.77
	1955											1.00	1.00	1.66	0.66	0.21	0.94	0.32	0.45	0.14	0.75	0.80	0.83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.83	0.75	0.90	0.26	[illegible]	[illegible]	0.70	0.29	0.72	0.30	0.64
	1960											1.00	1.00	1.18	[illegible]	0.33	[illegible]	0.25	0.44	0.14	0.74	0.60	0.82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.87	[illegible]	[illegible]	[illegible]	0.71	0.25	0.72	0.23	0.61
7	1946													1.00	1.00	0.11	[illegible]	0.13	0.96	0.08	1.12	0.50	1.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.14	[illegible]	1.26	[illegible]	1.50	0.15	[illegible]	[illegible]	1.15	0.09	1.15	0.18	1.23
	1950													1.00	1.00	[illegible]	[illegible]	[illegible]	0.84	0.08	1.10	0.45	1.25	[illegible]	1.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.15	1.35	0.14	[illegible]	[illegible]	1.03	0.11	1.06	0.19	1.09
	1955													1.00	1.00	0.13	[illegible]	[illegible]	0.68	0.09	1.12	0.48	1.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.32	[illegible]	1.36	0.15	[illegible]	[illegible]	1.05	0.17	1.08	0.13	0.97
	1960													1.00	1.00	[illegible]	[illegible]	0.21	0.69	0.12	1.15	0.51	1.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.42	[illegible]	1.36	0.18	[illegible]	[illegible]	1.10	0.22	1.12	0.20	0.95
8	1946															1.00	1.00	1.62	0.71	0.75	0.84	0.48	0.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.76	1.22	1.70	[illegible]	[illegible]	0.86	0.83	0.86	1.60	0.92
	1950															[illegible]	1.00	1.61	0.60	0.81	0.79	0.64	0.89	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.77	1.41	[illegible]	[illegible]	0.74	1.09	0.76	1.95	0.78
	1955															[illegible]	[illegible]	1.51	0.48	0.68	0.79	0.76	0.88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.95	1.23	[illegible]	[illegible]	0.74	1.32	0.76	1.40	0.68
	1960															[illegible]	[illegible]	1.76	0.45	0.43	0.75	0.82	0.84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.89	0.66	[illegible]	[illegible]	0.72	0.78	0.74	0.70	0.62
9	1946																	1.00	1.00	0.46	1.18	0.76	0.85	0.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.05	[illegible]	[illegible]	1.20	0.51	1.21	0.98	1.29
	1950																	1.00	1.00	0.51	1.31	0.89	1.48	0.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.88	[illegible]	[illegible]	1.22	0.68	1.26	1.21	1.30
	1955																	1.00	1.00	0.45	1.65	0.45	1.84	0.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.81	[illegible]	[illegible]	1.54	0.90	1.59	0.93	1.42
	1960																	1.00	1.00	0.56	1.66	0.40	1.35	0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.87	1.41	0.74	1.60	1.03	1.62	0.93	1.38
10	1946																			1.00	1.00	0.97	1.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.26	[illegible]	[illegible]	1.02	1.18	1.03	.13	1.10
	1950																			1.00	1.00	0.72	1.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.74	[illegible]	[illegible]	0.94	1.34	0.96	.40	0.99
	1955																			1.00	1.00	0.52	1.12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.81	[illegible]	[illegible]	0.94	2.00	0.97	.05	0.86
	1960																			1.00	1.00	0.27	1.11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.55	[illegible]	[illegible]	0.96	1.53	0.98	.65	0.83
11	1946																					1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.39	[illegible]	0.38	[illegible]	[illegible]	0.39	0.19	0.90	[illegible]	[illegible]
	1950																					1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.32	[illegible]	0.30	[illegible]	[illegible]	0.83	0.24	0.85	[illegible]	[illegible]
	1955																					1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.94	[illegible]	0.33	[illegible]	[illegible]	0.84	0.36	0.87	[illegible]	[illegible]
	1960																					1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.89	[illegible]	0.36	[illegible]	[illegible]	0.86	0.43	0.86	[illegible]	[illegible]
12	1946																							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.50	[illegible]	0.48	[illegible]	[illegible]	0.91	0.24	0.92	[illegible]	[illegible]
	1950																							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.41	[illegible]	0.39	[illegible]	[illegible]	0.81	0.30	0.83	[illegible]	[illegible]
	1955																							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.09	[illegible]	0.38	[illegible]	[illegible]	0.32	0.42	0.84	[illegible]	[illegible]
	1960																							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.99	[illegible]	0.40	[illegible]	[illegible]	0.84	0.48	0.85	[illegible]	[illegible]
13	1946																									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.82	[illegible]	0.79	[illegible]	[illegible]	0.80	0.39	0.81	[illegible]	[illegible]
	1950																									[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.53	[illegible]	0.50	[illegible]	[illegible]	0.73	0.39	0.75	[illegible]	[illegible]
	1955																									[illegible]	[illegible]	[illegible]	[illegible]	0.18	[illegible]	1.46	[illegible]	0.51	[illegible]	[illegible]	0.73	0.56	0.75	[illegible]	[illegible]
	1960																									[illegible]	[illegible]	[illegible]	[illegible]	0.16	[illegible]	1.20	[illegible]	0.49	[illegible]	[illegible]	0.75	0.58	0.76	[illegible]	[illegible]
14	1946																											[illegible]	[illegible]	0.11	[illegible]	0.42	[illegible]	0.40	[illegible]	[illegible]	1.00	0.20	0.91	[illegible]	[illegible]
	1950																											[illegible]	[illegible]	0.10	[illegible]	0.34	[illegible]	0.32	[illegible]	[illegible]	0.99	0.24	0.91	[illegible]	[illegible]
	1955																											[illegible]	[illegible]	0.12	[illegible]	0.93	[illegible]	0.32	[illegible]	[illegible]	[illegible]	0.35	0.96	[illegible]	[illegible]
	1960																											[illegible]	[illegible]	0.10	[illegible]	0.72	[illegible]	0.29	[illegible]	[illegible]	[illegible]	0.35	0.97	[illegible]	[illegible]
15	1946																													1.00	[illegible]	3.09	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.74	[illegible]	[illegible]	[illegible]
	1950																													1.00	[illegible]	3.31	[illegible]	3.11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1955																													1.00	[illegible]	7.96	[illegible]	2.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1960																													1.00	[illegible]	7.28	[illegible]	2.98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	1946																															1.00	[illegible]	0.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1950																															1.00	[illegible]	0.94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1955																															[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1960																															[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	1946																																	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1950																																	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1955																																	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1960																																	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	1946																																			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1950																																			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1955																																			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1960																																			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	1946																																					[illegible]	[illegible]	[illegible]	[illegible]
	1950																																					[illegible]	[illegible]	[illegible]	[illegible]
	1955																																					[illegible]	[illegible]	[illegible]	[illegible]
	1960																																					[illegible]	[illegible]	[illegible]	[illegible]
20	1946																																							[illegible]	[illegible]

* [illegible] Differentials are expressed in terms of ratios - i.e., [illegible]

industrial groups ($W^+E_S^+$ and $W^-E_S^-$) which the theory specifies, the ensuing results should provide a basis not only for assessing the merits of the sign test but should also serve as a critical test of the theory itself.

The results of this test are presented in Table 21. Although certain distinct patterns are clearly evident in this table, we have arranged and presented them in a form which is more amenable to general interpretation and analysis (see Table 22). Table 22 shows the number of statistically significant coefficients which derive from correlating Eij with Wij for industries in the groups $W^+E_S^+$ and $W^-E_S^-$.

To avoid any ambiguity as to what the figures in Table 22 represent, a brief explanation is necessary. The first row of numbers 20, 21, 30,...,34 represent industries which are characterized by declining relative wages and relative employment shares ($W^-E_S^-$). Alternatively, the column of numbers 10, 27, 31,...,28, represent industries ($W^+E_S^+$) whose relative wages and relative employment shares have been increasing throughout the period. The numbers 8, 9, 8,...,0 in the row headed by industry 10 are the respective number of significant coefficients which result from correlating the employment differentials of each industry with respect to industry 10 and the corresponding wage-differentials with respect to industry's 10 wages.

Table 21 indicates that there are 972 correlation coefficients and that the maximum number of significant coefficients in respect of any two industries is 9. From Table 22 one notices that only 338 of a possible 972 coefficients are signi-

TABLE 21

CORRELATION COEFFICIENTS OF THE RELATION BETWEEN EMPLOYMENT DIFFERENTIALS AND WAGE DIFFERENTIALS AMONG INDUSTRIES COMPRISING THE GROUPS $W^{+}E^{+}_{s}$ AND $W^{-}E^{-}_{s}$
ONTARIO 1946-1960

E_d \ W_d	14/2	17/2	18/2	20/2	21/2	34/2	37/2	39/2	40/2
14/2	.41	.26	.06	.78	.75	.21	.53	.53	.31
17/2	.40	.24	.16	.81	.87	.08	.50	.64	.46
18/2	.64	.61	.48	-.06	.09	.66	.41	.02	.19
20/2	.07	-.03	-.15	.81	.72	-.01	.40	.57	.20
21/2	-.02	-.18	-.35	.89	.66	-.18	.28	.52	-.06
34/2	-.16	-.29	-.46	.72	.36	-.21	.17	.26	-.36
37/2	-.20	-.23	-.32	.80	.67	-.27	.28	.57	.17
39/2	.26	.11	-.10	.83	.67	.06	.45	.47	.10
40/2	-.01	-.06	-.26	.64	.67	.16	.25	.68	.19

E_d \ W_d	14/10	17/10	18/10	20/10	21/10	34/10	37/10	39/10	40/10
14/10	.67	.62	.54	.74	.87	.35	.73	.67	.78
17/10	.71	.64	.61	.75	.89	.37	.71	.70	.80
18/10	.55	.62	.49	.32	.50	.49	.58	.34	.51
20/10	.63	.56	.53	.78	.88	.32	.72	.71	.78
21/10	.63	.50	.46	.85	.87	.27	.69	.72	.69
34/10	.54	.40	.37	.81	.78	.13	.67	.63	.59
37/10	.56	.48	.46	.77	.83	.25	.65	.71	.74
39/10	.71	.63	.55	.82	.89	.37	.75	.69	.76
40/10	.43	.38	.28	.64	.78	.33	.53	.67	.58

E_d \ W_d	14/13	17/13	18/13	20/13	21/13	34/13	37/13	39/13	40/13
14/13	.88	.44	.40	.82	.90	.14	.61	.71	.63
17/13	.74	.38	.55	.74	.89	.01	.50	.69	.69
18/13	.12	.32	.09	-.35	-.19	.37	.05	-.26	-.27
20/13	.54	.11	.33	.87	.83	.01	.53	.80	.65
21/13	.64	.10	.18	.96	.75	-.04	.46	.74	.41
34/13	.36	-.19	-.07	.82	.42	-.21	.31	.51	.01
37/13	.39	.05	.28	.81	.72	-.10	.46	.75	.67
39/13	.82	.34	.29	.93	.79	.08	.58	.65	.41
40/13	.47	.18	.17	.62	.68	.40	.35	.79	.56

E_d \ W_d	14/15	17/15	18/15	20/15	21/15	34/15	37/15	39/15	40/15
14/15	.10	-.26	-.04	.56	.32	-.17	-.15	.33	-.18
17/15	.49	.19	.47	.75	.77	-.06	.21	.64	.34
18/15	-.61	-.34	-.54	-.61	-.51	-.09	-.38	-.57	-.67
20/15	.35	-.02	.33	.70	.46	.06	.19	.60	.26
21/15	.29	-.08	.08	.73	.44	-.06	.15	.50	.08
34/15	-.05	-.38	-.17	.43	.02	-.26	-.10	.17	-.26
37/15	.56	.24	.54	.80	.60	.14	.41	.74	.56
39/15	.21	-.10	-.03	.67	.35	-.11	.09	.33	-.12
40/15	.31	.10	.17	.51	.49	.41	.18	.66	.30

E_d \ W_d	14/16	17/16	18/16	20/16	21/16	34/16	37/16	39/16	40/16
14/16	.24	.17	.11	.86	.90	.03	.46	.64	.29
17/16	.21	.15	.10	.82	.90	.01	.43	.62	.29
18/16	.37	.30	.25	.88	.91	.17	.56	.71	.40
20/16	.18	.12	.05	.85	.88	-.02	.42	.60	.23
21/16	.17	.10	.03	.87	.86	-.04	.41	.59	.20
34/16	.19	.10	.03	.89	.82	-.04	.43	.58	.18
37/16	.11	.07	-.02	.81	.86	-.08	.37	.55	.18
39/16	.22	.16	.09	.87	.88	.02	.45	.62	.26
40/16	.16	.11	.01	.82	.89	-.03	.39	.59	.21

E_d \ W_d	14/23	17/23	18/23	20/23	21/23	34/23	37/23	39/23	40/23
14/23	.72	.62	.46	.52	.69	.44	.61	.46	.49
17/23	.61	.47	.46	.67	.85	.22	.55	.62	.58
18/23	.54	.56	.50	-.27	-.06	.61	.28	-.11	.12
20/23	.33	.26	.19	.77	.82	.15	.56	.66	.44
21/23	.16	.02	-.17	.91	.74	-.01	.37	.59	.09
34/23	-.07	-.15	-.37	.65	.32	-.22	.23	.20	-.35
37/23	.01	-.04	-.06	.81	.74	-.18	.38	.67	.37
39/23	.53	.41	.21	.73	.69	.23	.55	.47	.27
40/23	.06	.05	-.16	.58	.70	.25	.27	.71	.25

E_d \ W_d	14/25	17/25	18/25	20/25	21/25	34/25	37/25	39/25	40/25
14/25	.41	.51	.10	-.31	-.07	.36	.21	-.25	-.01
17/25	.61	.58	.31	.15	.42	.27	.40	.18	.29
18/25	.24	.38	.15	-.54	-.33	.45	.04	-.39	-.15
20/25	.44	.51	.11	.07	.26	.30	.50	.09	.19
21/25	.04	.01	-.45	.49	.38	-.22	.25	.18	-.23
34/25	-.11	-.04	-.43	-.13	-.31	-.16	.02	-.40	-.52
37/25	.23	.13	.11	.76	.67	-.13	.50	.67	.47
39/25	.41	.44	-.03	.04	.10	.23	.31	-.12	-.10
40/25	-.10	.01	-.37	.22	.43	.26	.14	.42	.00

E_d \ W_d	14/27	17/27	18/27	20/27	21/27	34/27	37/27	39/27	40/27
14/27	.86	.52	.28	.80	.81	.19	.60	.72	.58
17/27	.87	.57	.57	.80	.92	.15	.58	.77	.74
18/27	.05	.27	-.05	-.37	-.23	.33	.01	-.28	-.30
20/27	.61	.24	.32	.85	.76	.10	.55	.81	.63
21/27	.54	.12	.11	.87	.67	-.01	.43	.69	.34
34/27	.23	-.20	-.15	.68	.30	-.26	.23	.41	-.04
37/27	.50	.20	.34	.80	.69	.03	.50	.76	.66
39/29	.76	.40	.21	.90	.73	.12	.58	.65	.38
40/27	.34	.14	.06	.55	.60	.38	.31	.72	.42

E_d \ W_d	14/28	17/28	18/28	20/28	21/28	34/28	37/28	39/28	40/28
14/28	-.12	-.22	-.01	.03	-.15	-.22	-.17	.03	-.01
17/28	.06	-.05	.18	.20	.05	-.10	-.03	.22	.17
18/28	-.38	-.41	-.19	-.36	-.51	-.38	-.37	-.32	-.31
20/28	-.06	-.17	.03	.09	-.07	-.15	-.10	.10	.04
21/28	.03	-.16	.01	.20	.00	-.13	-.08	.15	.02
34/28	-.16	-.28	-.09	.06	-.17	-.27	-.20	-.01	-.11
37/28	.05	-.05	.11	.23	.07	-.04	.03	.25	.16
39/28	-.06	-.19	.01	.14	-.08	-.19	-.11	.08	-.01
40/28	-.06	-.15	-.04	.14	.06	-.00	-.08	.23	.04

E_d \ W_d	14/31	17/31	18/31	20/31	21/31	34/31	37/31	39/31	40/31
14/31	.66	.34	.40	.87	.83	.13	.57	.86	.64
17/31	.73	.46	.54	.83	.90	.15	.56	.84	.73
18/31	.11	.27	.13	-.25	-.13	.34	.12	-.13	-.12
20/31	.56	.25	.40	.80	.70	.15	.51	.81	.62
21/31	.48	.13	.21	.84	.64	.03	.41	.72	.38
34/31	.26	-.10	.07	.68	.34	-.13	.25	.50	.12
37/31	.53	.26	.38	.78	.67	.11	.49	.78	.64
39/31	.68	.35	.36	.93	.74	.14	.57	.76	.49
40/31	.35	.16	.16	.56	.59	.33	.31	.74	.44

E_d \ W_d	14/33	17/33	18/33	20/33	21/33	34/33	37/33	39/33	40/33
14/33	.58	.35	.42	.87	.75	.12	.46	.49	.48
17/33	.62	.40	.56	.87	.86	.11	.48	.57	.61
18/33	.45	.45	.31	.36	.36	.39	.34	.10	.07
20/33	.52	.27	.41	.88	.74	.10	.45	.54	.50
21/33	.53	.24	.33	.89	.68	.07	.42	.52	.39
34/33	.44	.13	.22	.82	.51	-.01	.35	.40	.22
37/33	.50	.27	.43	.88	.74	.06	.47	.60	.60
39/33	.58	.34	.40	.88	.70	.12	.46	.48	.41
40/33	.48	.28	.32	.78	.74	.31	.40	.64	.54

E_d \ W_d	14/35	17/35	18/35	20/35	21/35	34/35	37/35	39/35	40/35
14/35	.03	.21	-.14	.19	.71	.19	.12	.41	.21
17/35	-.18	-.08	-.20	.32	.81	-.21	.05	.39	.15
18/35	.26	.48	.28	-.46	-.27	.53	.06	-.25	-.12
20/35	-.08	-.11	-.10	.55	.81	-.01	.20	.69	.42
21/33	.05	-.17	-.24	.81	.80	-.14	.19	.68	.10
34/35	.34	-.03	.06	.79	.43	.05	.23	.64	.04
37/35	-.10	-.20	-.11	.65	.75	-.21	.22	.67	.48
39/35	.28	.21	-.05	.70	.82	.12	.31	.56	.16
40/35	-.10	-.13	-.25	.38	.64	.20	.08	.66	.24

NOTE Underlined coefficients are significant at the five per cent level Industry numbers in rows W_d and columns E_d correspond with the numerical order of industries given in Table 2

TABLE 22

NUMBER OF STATISTICALLY SIGNIFICANT COEFFICIENTS FOUND IN THE RELATIONSHIPS OF $W^-E^-_s$ AND $W^+E^+_s$ - ONTARIO, 1946-1960

$W^-E^-_s$ $W^+E^+_s$	20	21	39	14	40	37	18	17	34	
10	8	9	8	8	9	9	4	6	0	61
27	8	7	7	6	4	4	1	2	0	39
31	8	7	7	5	4	5	1	0	0	37
13	8	7	8	5	5	3	1	0	0	37
23	8	7	5	4	1	4	0	2	1	32
33	8	8	5	5	2	0	1	0	0	29
16	9	9	9	0	0	0	0	0	0	27
2	8	7	6	1	0	1	0	1	1	25
15	8	3	5	2	2	0	2	0	0	22
35	5	7	6	0	0	0	0	0	1	19
25	2	1	1	1	1	0	0	3	0	9
28	0	1	0	0	0	0	0	0	0	1
	80	73	67	37	28	26	10	14	3	338

Source: Table 21

ficant at the 5 per cent level. It is also apparent from that table that the number of significant coefficients associated with industries 17, 18, 34, 25 and 28 are minimal. Now if these industries were excluded from Table 21, the ratio of the number of significant coefficients to the total would be 304/540. In other words approximately 60 per cent of the results would be quite consistent with the implications of the theory. But are there legitimate economic reasons for excluding industries 17, 18, 34, 25 and 28 from the groups $W^+E_S^+$ and $W^-E_S^-$? We venture to say there are.

If one were to examine closely the ranks of wages and employment shares of industries 17 and 34 (Table 7) one would discover that if the base year against which the directional changes in the ranks of employment shares of these industries were compared was 1947 instead of 1946, then these industries would fall in the category ($W^+E_S^-$) - i.e. capital intensive industries and not $W^+E_S^+$ "labour expanding". Given the nature of the industries (17 - Fruit and Vegetable Canning and 34 - Soft Drink Manufacture) there is every reason to suppose that they are in fact highly capital intensive.

In the case of industries 25 and 28 (Table 7) discloses that the ranks of their respective employment shares remain very nearly constant through the period. Consequently, these two industries, in particular industry 28, are industries which strove to maintain a constant share of the work force. In order to do this, however, they had for the most part to increase their wages. One therefore finds a situation (which accords fully with one aspect of the theory)

where on average relative wages increase but relative employment shares were, for all practical purposes, a constant. Hence whereas the correlation coefficients associated with industries 25 and 28 are statistically not significant, yet they are valid in terms of the theory. Cases such as this greatly highlight the importance of Professor Simons' concern about the meaning of statistical significance (see p. 12). It should be emphasized here that it is to the credit of the sign test that it pointed to the necessity of re-examining these industries. It is quite possible that if the sign test were set up to analyze directional changes of ranks on a year over year basis i.e. in terms of link relatives, rather than with reference to a base year which may be normal for some industries only, then it is not inconceivable that some of these problems might not have arisen. Another possible variation would be to apply the technique to various phases of the business cycle.

Having attempted to justify the exclusion of industries 17, 34, 25 and 28 from Table 21 and 22, it now remains to say why industry 18 should also be excluded. Industry 18 is a special case. In 1956 this industry was re-classified. Hence the data for the industry as of 1957 are not strictly comparable with that for the period 1946-1956.

PART IV

SUMMARY AND CONCLUSION

We will now attempt to bring together some of the important findings and implications which have emerged from this study.

Briefly, the main finding seems to be that there are basically two allocative mechanisms operating in the labour market at all times to redistribute manpower among the manufacturing industries. These mechanisms are, (1) the movements of inter-industry wage differentials over time, and (2) the existence of job vacancies otherwise referred to as employment opportunities.

The relative strength of these mechanisms varies through time with fluctuations in the level of business activity, technological changes, and changes in the importance and character (capital or labour intensive) of the major industries.

Under tight labour market conditions, as are customarily experienced at or near the peak of the business cycle, wage-differentials play a dominant role in the allocation of manpower. But during the downswing, when there is an excess supply of all classes of workers, employment opportunities play a much greater role in the re-deployment of labour. In addition, fluctuations in the number of industries falling in the category associated with employment opportunities ($W^{-}E_{S}^{+}$), behaved like a leading indicator of major fluctuations in business activity.

Technological changes would seem to generate the type of market conditions in which employment opportunities are likely to be the prime allocative

mechanism. This stems from the fact that technological changes serve to do the following: create a demand for certain specialized skills some of which might have been virtually non-existent, render some conventional skills obsolete, and therefore decrease the mobility of various classes of workers. The immobility of workers are in this case occasioned by the narrowing of specialized skills to meet the need of particular users. That is to say, the more narrowly specialized workers are, or the narrower the occupational classification of skills the greater is the possibility of immobility of workers even within their own field outside a particular industry or market area. On the other hand, workers possessing more conventional skills, which are still in effective demand, usually find that they have to adapt their skills to complement the newly emergent skills. Hence, even conventional skills tend to become more narrowly specialized - further limiting the mobility of these workers. We strongly suspect, therefore, that technological changes are operating to create labour market structures which tend to be monopsonistic and/or oligopsonistic.

Furthermore, the results of the tests strongly indicate that empirical studies based on absolute rather than relative wage and employment movements cannot get at the main implications of the theory, mainly because the use of absolutes makes it extremely difficult, if not impossible, to identify the groups of industries to which the theory alludes.

Lastly, the findings, as discussed earlier on in this study, not only corroborated the Phillips' curve but also served to provide a plausible explanation of

the kind of market and institutional forces which may have generated the phenomenon captured by the curve.

What do these findings imply for the validity of the theory? It should be evident from the findings that the theory is incomplete. The theory does not take cognizance of the significant role of employment opportunities, and hence fails to explain and predict the combined interaction of two predominant allocative mechanisms, at least at the industry level. None the less, the theory may be more or less applicable at either the firm or sector level.

At this stage it is important to consider, in the light of the findings, the extent to which labour mobility and wage determination are in fact interrelated. This we will attempt to do against the background of Professor Reynolds' excellent summary of competitive labour market theory.

> According to Reynolds, *The concept of a competitive labour market is attractive because it succeeds in fusing mobility and wage determination into a single problem. In considering mobility, one finds the wage structure as a major determinant of movement among occupations, firms, and areas. When one turns to examine the wage structure, one finds it shaped by actual and potential mobility of labour. One moves around a closed circle of predictable relationships and results.*[27]

He warns, however, that this conception of a competitive labour market has been frequently challenged because of trade union activities and their impact on market forces. For this reason, *recent discussions of labour markets, as of product markets, have run increasingly in terms of "workable" though "imperfect" competition.*[28]

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(27) Reynolds, op. cit., p. 207.

(28) Ibid., p. 208.

Given the constraints of lack of knowledge and institutional rigidities, Reynolds summarizes the main implications of the theory as follows:

> *1) Workers will choose better jobs in preference to poorer ones. Voluntary movement of labour will show a drift from less desirable to more desirable jobs. Employers whose jobs are particularly desirable will have a surplus of applicants for work, while employers at the other end of the scale will encounter labour shortages.*
>
> *2) (Thus) an employer who wishes to retain a constant share of the area labour force must keep the over-all attractiveness of his jobs in line with the attractiveness of jobs offered by other employers.*
>
> *3) In consequence of this behaviour of workers and employers, there is a tendency toward equalization of the net attractiveness of all jobs in the area.*[29]

To what extent are these implications of competitive labour market theory borne out by the findings of the study?

In so far as the study points to the existence of two allocative mechanisms which operate simultaneously in the labour market to redistribute manpower among industries - the findings do constitute a refutation of the first implication of the competitive labour market theory. As long as these two allocative mechanisms are operative, the freedom of workers to gravitate to better paying jobs will be considerably curtailed. If it were otherwise then there would be no such group of industries as $W^+E_S^-$. Nor would one encounter the group $W^-E_S^+$. Labour productivity no doubt plays a significant role in the movement of wage earnings of workers in those industries comprising the group $W^+E_S^-$. It is quite conceivable that the number of workers demanded by an industry may not change but if labour productivity is increasing markedly, it is reasonable to suppose that workers' earnings will increase even though the industry may not desire to attract

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(29) Ibid., p. 209.

additional workers. This would seem, a priori, to be particularly likely where production workers are strongly unionized as is the case over a wide range of Canadian manufacturing industries. In short, changes in labour productivity are more likely to serve as indicators of an industry's ability to pay its workers. But increases in wage-earnings which are due to productivity changes and/or trade-union pressure need not bear any direct relation to the industry's desire to recruit additional workers. Consequently, the evidence would seem to indicate that employers whose jobs are particularly desirable may not be interested in recruiting additional labour. But even if they were, their skill requirements are usually such that large numbers of these workers could not be had in the short-run. On the other hand employers with less desirable jobs - i.e. jobs which do not require narrow and intense specialization, will encounter no difficulty in recruiting workers - such as the technologically displaced and others.

From the above it follows that an employer who desires to retain a constant share of the labour force need *not* keep "the over-all attractiveness of his jobs in line with the attractiveness of jobs offered by other employers". If wage-differentials were the sole mechanism which accounted for the movement of labour among industries, then the second proposition of competitive labour market theory would be more or less valid.

Now since the third proposition of the theory relating to the characteristics of the wage structure is regarded as a consequence of the operation of the first two propositions, and since these propositions are invalid, this implies that the

third proposition must be invalid also. Recalling, Hicks maintained that "the conditions of equilibrium postulate no more than that the 'net advantages' of the employment in different places must be equal for labour of equal efficiency".[30] But since the Hicksian conditions of equilibrium derive in the main from premises which are consistent with competitive labour market theory discussed above, it cannot really be considered as valid in terms of our empirical findings. This points to the necessity of investigating how the underlying forces of the two allocative mechanisms found in this study interact to generate an over-riding tendency toward equilibrium.

Finally, an important aspect of the findings arises out of its implications for incomes policy. Incomes policy is usually advocated on the assumption that wages are not performing their allocative function effectively. This study in indicating that there are two allocative mechanisms in the labour market, would lead one to suggest that a discriminatory incomes policy could be attempted. Notwithstanding, it should be borne in mind that the study is only in respect of one sector, and generalization from such an experience may be hazardous. Furthermore, since this study does not attempt to evaluate the impact of the other major determinants of wages, it seems unwise at this stage to draw any firm inference relating to incomes policy from this study. It seems enough to say that the study points to a new way of analyzing the relation between wage-differentials and labour mobility, and could therefore provide a different approach to the study of incomes policy.

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(30) See quotation from Hicks on page 6 supra.

APPENDIX I

LIST OF PARTICIPANTS IN DEBATES ON ECONOMIC METHODOLOGY

Archibald, G.C., "The State of Economic Science", British Journal for the Philosophy of Science, Vol. X, May 1959.

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APPENDIX II

SOURCES OF PRIMARY STATISTICAL DATA

1. Dominion Bureau of Statistics: General Review of the Manufacturing Industries of Canada, Catalogue No. 31-201, Queen's Printer, Ottawa, Various Issues.

2. Dominion Bureau of Statistics: Review of Employment and Payrolls, Catalogue No. 72-201, Queen's Printer, Ottawa, Various Issues.

3. Dominion Bureau of Statistics: Canada Year Book, Queen's Printer, Ottawa, Various Issues.

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--------------- "Problems of Methodology - Discussion", American Economic Review, Vol. LIII, May 1963.

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